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Unregulated Exhaust Emissions from Non-Catalyst Baseline Cars Under Malfunction Conditions

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This report describes the laboratory effort to characterize regulated and unregulated exhaust emissions from 1970 model non-catalyst gasoline automobiles operating under malfunction conditions. Four automobiles were evaluated over three driving schedules in the unmodified configuration and in up to three engine and/or emission control system malfunction configurations. Exhaust emission constituents measured, in addition to the currently regulated emissions, include: particulates, sulfates, aldehydes, sulfides, amines, metals and several additional elements and compounds. Additional evaluations, in each of the configurations, involved the measurement of the regulated emissions over four short-test procedures.

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by

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Contract No. 68-03-2884
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Emission Control Technology Division
Ann Arbor, Michigan 48105

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FOREWORD

These project tasks were initiated by the Control Technology Assessment and Characterization Branch, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, Michigan 48105. The engineering and analytical effort on which this report is based was accomplished by the Department of Emissions Research of Southwest Research Institute, 6220 Culebra Road, San Antonio, Texas 78284. These project tasks, authorized by Task Specifications 4 and 5 under Contract 68-03-2884, were initiated on June 13, 1980 and August 19, 1980 and were completed on March 4, 1981. The project under which these tasks were conducted was identified within Southwest Research Institute as Project 05-5830.

The SwRI Project Leader was Mr. Charles Urban, who supervised all vehicle testing, data analyses and reporting. Dr. Lawrence Smith was in charge of the unregulated emissions procedural development-related activities that were involved in this project. Mr. Charles Hare was Project Manager and was involved in the initial technical and fiscal negotiations and subsequent major project decisions.

The Project Officer throughout the project was Mr. Robert Garbe of the Control Technology Assessment and Characterization Branch, Environmental Protection Agency. The EPA Task Branch Technical Representative was Ms. Colleen DeMeyer. Mr. Frank Black and members of his staff, of the Environmental Protection Agency at Research Triangle Park in North Carolina, conducted the elemental analyses.

ABSTRACT

This report describes the laboratory effort to characterize regulated and unregulated exhaust emissions from 1970 model non-catalyst gasoline automobiles operating under malfunction conditions. Four automobiles were evaluated over three driving schedules in the unmodified configuration and in up to three engine and/or emission control system malfunction configurations. Exhaust emission constituents measured, in addition to the currently regulated emissions, include: particulates, sulfates, aldehydes, sulfides, amines, metals and several additional elements and compounds. Additional evaluations, in each of the configurations, involved the measurement of the regulated emissions over four short-test procedures.

SUMMARY

The major objective of these project tasks was to study exhaust emissions for non-catalyst gasoline automobiles, operating under malfunction conditions. These evaluations involved analyzing the exhaust for many unregulated compounds and elements in addition to the currently regulated emissions.

This study involved four 1970 model automobiles: an Oldsmobile Delta 88, a Dodge Challenger, a Chevrolet Monte Carlo, and a Ford Fairlane. Each automobile was evaluated in the unmodified (tuned-up to manufacturer's specifications) and in up to three different malfunction configurations. Malfunction conditions evaluated were rich idle, twelve percent ignition misfire, and lean idle.

Unregulated emission compounds measured included: sulfates, particulates, metals and other elements, aldehydes, cyanides, sulfides, organic amines, ammonia, and leaded fuel compounds. A number of analytical procedures for these compounds were developed specifically for use in previous projects. The analysis method for leaded fuel compounds was assembled, specifically for use in this study, using the procedure obtained from the EPA at RTP.

The three primary test sequences involved in this project were the light-duty Federal Test Procedure (FTP), the congested freeway driving schedule and the highway fuel economy driving schedule. In addition, the regulated emissions were evaluated over four steady-state procedures. The basic requirements specified in the Code of Federal Regulations for certification of light-duty vehicles were followed for the three primary test sequences.

A significant data base on the cars evaluated, for both regulated and unregulated emissions, was generated in this project. These data were analyzed to the extent applicable and are presented in several different formats to facilitate their review and usage. The FTP overall average values, for the unmodified configuration, and the highest values detected, for any of the configurations evaluated, are summarized as follows:

	Emission Rate, mg/km	
Emission	Average in Unmodified Configuration	Maximum in Any Configuration
Hydrocarbons	1,900	15,200
Carbon Monoxide	17,100	59,000
Oxides of Nitrogen	2,600	3,700
Total Particulates	99	222
Aldehydes & Ketones	37	255
Sulfate	<1	3
Cyanide & Cyanogen	3	10
Ammonia	4	17
Hydrogen Sulfide	<1	<1
Organic Sulfides	<1	<1
Organic Amines	<1	<1

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I. INTRODUCTION

This report describes the effort to characterize regulated and unregulated exhaust emissions from four 1970 model gasoline automobiles operating in the unmodified and under malfunction conditions. This is the fifth project to be completed from among several related projects at SwRI involving the evaluation of a large number of unregulated emissions from gasoline automobiles. The initial projects involved evaluation of late model non-catalyst, oxidation catalyst and three-way catalyst gasoline automobiles.(1,2,3,4)*

A. Project Objective

The major objective of this project was to evaluate the effects of engine malfunction conditions on exhaust emissions from pre-catalyst gasoline automobiles. Emissions evaluated include the three currently regulated emissions (HC, CO, and NO_x) along with a significant number of currently unregulated compounds (e.g., sulfates, sulfides, aldehydes, amines, etc.).

B. Emissions Measurement Procedures

The compounds or compound groups evaluated, along with the sampling methods used, were as follows:

Sampling Method	Compounds Evaluated
Bag	HC, CO, NO_x, CO_2, Individual HC, and Leaded Fuel Components
Filter	Sulfates, Particulates, Metals, and Other Elements
Impinger	Cyanides, Aldehydes, Hydrogen Sulfide, Ammonia and Organic Amines
Trap	Carbonyl and Organic Sulfides.

A number of the procedures for measuring unregulated emissions were developed in another project and reported in a widely distributed interim report.(5)

C. Vehicles Evaluated

Four 1970 model automobiles were evaluated in this project. Included were a Chevrolet Monte Carlo, a Dodge Challenger, a Ford Fairlane, and an Oldsmobile Delta 88. Compared to uncontrolled automobiles, emission controls on these cars involved positive crankcase ventilation, engine modifications, and some spark and air/fuel calibration changes. These automobiles, which were provided by the manufacturers through the EPA, had previously undergone testing in a baseline emissions program.

---

*Superscript numbers in parentheses designate references at end of the report.

D. Malfunction Conditions Evaluated

Malfunction conditions included: rich idle, 12 percent ignition misfire and lean idle. The rich idle condition involved adjusting to the idle mixture producing highest engine speed at idle. The 12 percent ignition misfire condition was obtained using an essentially random misfire generator that was fabricated and used in previous projects. Lean idle involved an idle mixture at which lean misfire remained barely acceptable.

E. Vehicle Testing

The automobiles involved in this study were tested in the unmodified configuration (i.e., tuned-up to manufacturer's specifications) and in up to three malfunction conditions. The test sequence included the Light-Duty Federal Test Procedure (FTP)(6), the Congested Freeway Driving Schedule (SET)(7), and the Highway Fuel Economy Driving Schedule (HFET).(8) To the extent practical, all specified unregulated exhaust constituents were sampled and analyzed during every test. In addition, HC and CO emissions were measured in each configuration using three short-test procedures.

II. GENERAL EQUIPMENT, INSTRUMENTS, PREPARATION AND PROCEDURES

This section describes the automobiles, the fuel and lubricant, the facilities and the general instrumentation and procedures utilized in this project. The overall sampling systems for the unregulated emissions are also discussed.

A. Automobiles

Four 1970 model gasoline-powered automobiles were evalauted in this project. These automobiles (cars), which were provided by the manufacturers through the EPA, are described in Table 1. Prior to use in this project, these cars had undergone evaluations in a baseline emissions program.

B. Fuel and Lubricant

The fuel used in this project was a leaded gasoline obtained from Howell Refinery. Properties of this gasoline, along with national average values for 1970, are given in Table 2. The SwRI identification number of this leaded gasoline was EM-433. Selection of this fuel was based on its availability, along with its having reasonably acceptable properties.

The engine lubricant used was Quaker State 10W-40 Deluxe. This motor oil has a significant sales volume and met the car manufacturers' recommendations for 1970 cars.

C. Dynamometer and CVS System

A Clayton Model ECE-50 chassis dynamometer with a belt-driven variable-inertia flywheel system, was utilized for all transient testing. This belt-driven inertia system simulates equivalent weight of vehicles from 680 kg (1500 lbs) to 2495 kg (5500 lbs), in 115 kg (250 lbs) increments to 1360 kg, and in 225 kg increments above 1360 kg.

The constant volume sampler (CVS) used for these evaluations was SwRI CVS Number 2. This unit has a nominal capacity of 9.2 m^3/min (325 cfm). A nominal 460 mm (18 inch) diameter by 5 m (16 feet) long dilution tunnel was used between the intake filter and the CVS to enable sampling of sulfates and particulates.

Partial views of the chassis dynamometer, the dilution tunnel and the intake to the CVS can be seen in subsequent Figure 2. Both the dynamometer and the CVS were calibrated, maintained and operated in accordance with the manufacturer's instructions and the appropriate sections of the Code of Federal Regulations applicable to light-duty vehicles.(6)

In addition to the 142 m^3/min (5000 cfm) cooling fan placed in front of the automobile, 42 m^3/min (1500 cfm) blowers were available to cool each rear wheel. These additional blowers were used only during the SET and HFET driving cycles.

TABLE 1. AUTOMOBILES EVALUATED

Project Car Number	Automobiles				
	Year	Make	Model	Body Type	ID or Serial Number
71	1970	Oldsmobile	Delta 88	4-dr	354690X133744
72	1970	Dodge	Challenger	2-dr	JH23COE137160
73	1970	Chevrolet	Monte Carlo	2-dr	138570F182620
74	1970	Ford	Fairlane	2-dr	FOA29F27235F

Project Car Number	Engine CID/Cyl	Emission Controls		Transmission, Type/Gears	Accessories
		PCV	Other[a]		
71	455/8	Yes	ND	Automatic/3	PS, PB & AC
72	225/6	Yes	ND	Manual/3	None
73	350/8	Yes	ND	Automatic/3	PS, PB & AC
74	302/8	Yes	ND	Automatic/3	PS & AC

Project Car Number	Chassis Dynamometer Settings[b]			
	Inertia, Kilograms	Power, Kilowatts	Inertia, Pounds	Power, Horsepower
71	2040	9.5	4500	12.7
72	1590	8.4	3500	11.2
73	1810	8.9	4000	12.0
74	1810	8.9	4000	12.0

---

[a] No other emission controls were apparent.

[b] Dynamometer inertia and power settings were obtained from the EPA Project Officer.

TABLE 2. DESCRIPTION OF EM-433 LEADED GASOLINE

	EM-433	Bureau of Mines Summer 1970 Average
Specific Gravity, at 60°F	0.740	0.735
Reid Vapor Pressure, psi	7.9	9.1
Research Octane No.	92.0	93.8
Lead, g/Gal.	1.64	2.43
Sulfur, wt%	0.022	0.042
Distillation, °F (% Evaporated)		
IBP	95	93
10%	130	123
50%	207	207
90%	310	339
EP	357	410
Hydrocarbons, Vol. %		
Aromatics	29.8	--
Olefins	1.0	--
Saturates	69.2	--

D. Exhaust Sampling and Analysis

A pictorial schematic of the exhaust and sampling system is shown in Figure 1. This system is in accordance with the guidelines established in previous unregulated emissions projects conducted at SwRI for the EPA. A primary feature of this system is the number of sampling probes and collection units required to collect all of the required unregulated emission samples. This is illustrated in the several views of the system shown in Figure 2.

This section has described the dilution tunnel and provided some insight into the overall sampling system assembly. More details on each of the individual sampling systems for the unregulated emissions are given in Section III of this final report.

E. Instrumentation for Regulated Emissions and Engine Parameters

Bagged samples of the dilute exhaust were evaluated for HC, CO, NO_x, and CO_2 using SwRI Bag Cart Number 1. This bag cart was designed, calibrated and operated in accordance with the appropriate sections of the Code of Federal Regulations applicable to light-duty vehicles.(6) In addition, the vehicle speed and the oxygen level in the undiluted exhaust were continuously recorded. The instrumentation used for these continuously recorded data were as follows:

Parameter Measured	Instrument or Method		
	Type	Make & Model	Ranges Used
O_2	Polarographic	Beckman 715	5 & 25%
Speed	--- Analog output from the Dynamometer Controls ---		

The average oxygen level in the undiluted exhaust was obtained by integration of the continuous oxygen signal, using an Acromag 1324-LY-1 integrator. The average oxygen level has only a gross relative meaning for most of these evaluations. Oftentimes, the oxygen level was relatively high when the exhaust flow was low (e.g., idle and cut-throttle) and relatively low when the exhaust flow was relatively high (e.g., highway speed). The integration of the oxygen in the undiluted exhaust does not compensate for these changes in exhaust flow. It is possible to have a significant average oxygen level and yet be deficient in oxygen over some portions of the driving cycle. Therefore, the average oxygen level serves only as a general indicator of the malfunction condition (e.g., average oxygen level decreases somewhat for rich operation).

F. Emissions Test Procedures

The primary procedures and driving schedules utilized in this project are defined as follows:

FTP - 1979 Federal Test Procedure (6)
(uses the Urban Dynamometer Driving Schedule)

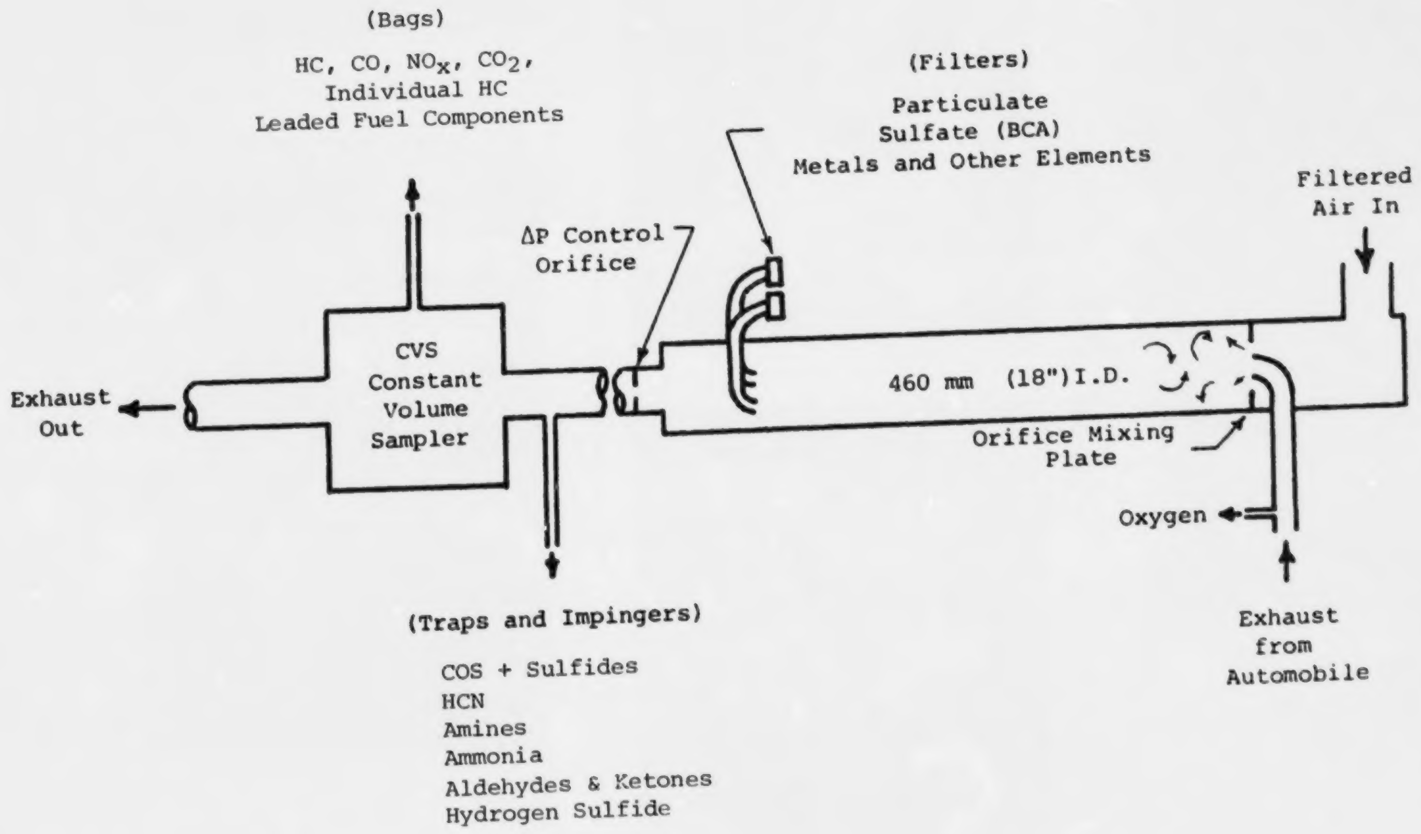
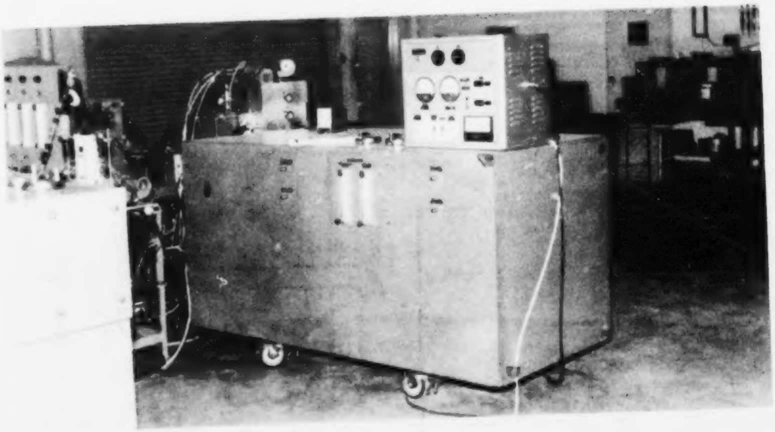
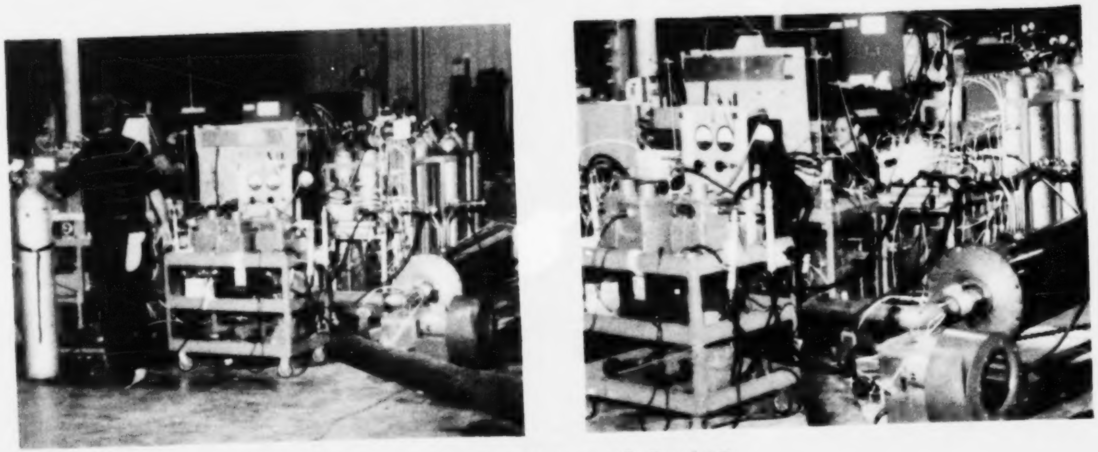


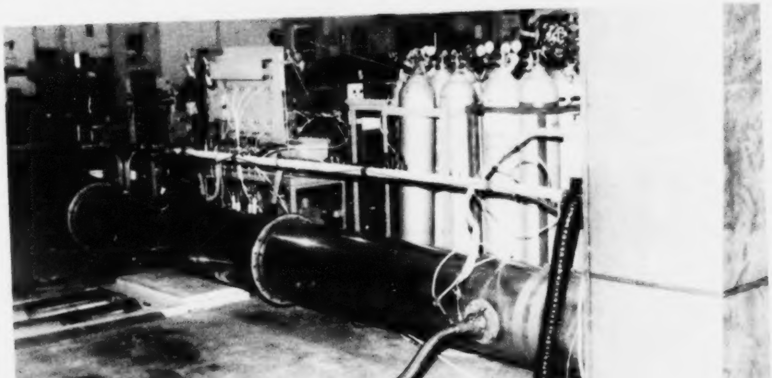
Figure 1. Gasoline engine emissions sampling system



A. CVS Side of the System



B. Front Views of System



C. Dynamometer Side of System

Figure 2. Views of the emissions sampling system

SET - Congested Freeway Driving Schedule(7)

HFET - Highway Fuel Economy Driving Schedule(8)

Each of the three primary procedures and schedules, requiring emissions testing in this project (FTP, SET, and HFET), utilized bagged samples for evaluation of regulated emissions and fuel consumption. In addition, evaluation of the regulated emissions was conducted using several short-test procedures. These short-test procedures are discussed in Section II.H.

The SET and the HFET are both hot-start, single-segment driving cycles. The FTP, however, involves cold-start and hot-start, multi-cycle with multi-segment operation. In addition, in this project a four-bag FTP was utilized for most of the unregulated emissions; rather than the three-bag FTP specified in the Federal Test Procedure. Therefore, before proceeding, it is important to clarify the meaning of FTP as used in this project.

FTP - The FTP uses the Urban Dynamometer Driving Schedule (UDDS) which is 1372 seconds in duration. The UDDS, in turn, is divided into two segments: a "transient" phase of 505 seconds and a "stabilized" phase of 867 seconds. The 1975 Federal Test Procedure consists of cold start "transient" and "stabilized" phases, followed by a hot start "transient." In this project, the hot start "transient" was followed by a hot start "stabilized." For the remainder of this discussion, and throughout this report, the four-cycle FTP will be identified as presented in Table 3. Therefore, with the assumption that any changes in distance traveled are negligible, the composite results with the four-cycle FTP relative to results with the three-cycle FTP will differ only as the mass emissions emitted during Cycle 4 differ from that emitted during Cycle 2. For the regulated emissions, the differences during cycles 2 and 4 were small, and the overall effects of such differences were essentially negligible.

The test sequence followed for each automobile is given in Table 4. Sequences 1 through 9 were repeated for each malfunction condition evaluated on each automobile. The sequence followed in the laboratory for running one set of emissions tests (FTP, SET and HFET) is given in Table 5.

The parameters of the three primary driving schedules are summarized in Table 6 and these schedules are illustrated in Figure 3. Other driving schedule designations frequently used are as follows:

Driving Schedule Designation Used	Other Common Designations
FTP	LA-4 and UDDS
SET	CFDS and SET-7
HFET	FET

TABLE 3. DESCRIPTION OF FOUR-CYCLE FTP

	Four-Cycle FTP			
	Cold UDDS		Hot UDDS	
Cycle	1	2	3	4
Duration, seconds	505	867	505	867
Regulated Emissions, 3-Bag	X	X	X	
Regulated Emissions, 4-Bag	X	X	X	X
Unregulated Emissions:				
Bag	X	X	X	X
Impinger	--- X ---		--- X ---	
Trap	--- X ---		--- X ---	

NOTE: X designates a sample taken

A composite value in mass per distance for the three-cycle, three sample FTP regulated emissions is calculated using the following formula:

$$\frac{\text{MASS}}{\text{DISTANCE}} = \frac{0.43 \times (\text{MASS } 1 + \text{MASS } 2)}{(\text{DIST. } 1 + \text{DIST. } 2)} + \frac{0.57 \times (\text{MASS } 3 + \text{MASS } 2)}{(\text{DIST. } 3 + \text{DIST. } 2)}$$

Since the same driving cycle is involved, Distance 3 is essentially equal to Distance 1 and this equation can be reduced to:

$$\text{3-FTP M/D} \simeq \frac{0.43 \times (M1 + M2) + 0.57 \times (M3 + M2)}{D1 + D2}$$

For the four-cycle FTP, two sample, composite values determined in this project, the following formula was used:

$$\frac{\text{MASS}}{\text{DISTANCE}} = \frac{0.43 \times M(1 + 2)}{(D1 + D2)} + \frac{0.57 \times M(3 + 4)}{(D3 + D4)}$$

Since Distance 3 is equal to Distance 1 and Distance 4 is equal to Distance 2, this equation can be reduced to:

$$\text{4-FTP M/D} \simeq \frac{0.43 \times M(1 + 2) + 0.57 \times M(3 + 4)}{D1 + D2}$$

TABLE 4. TEST SEQUENCE FOR EACH MALFUNCTION

Sequence	Operation Performed on Vehicle
Upon Receipt	Replace oil, oil filter and fuel. Precondition 40 minutes at 64 km/hr plus UDDS. Tune-up to manufacturer's specifications.
1	Precondition for 20 minutes at 64 km/hr plus two UDDS.
2	Run FTP, SET, HFET - Sample and analyze emissions.
3	Modify to operate in a malfunction condition.
4	Precondition for 20 minutes at 64 km/hr plus two UDDS.
5	Run FTP, SET, HFET - Sample and analyze emissions.
6	Run Short Cycle Procedures.
7	Run FTP, SET, HFET - Sample and analyze emissions.
8	Run Short Cycle Procedures.
9	Return to unmodified condition and tune-up to manufacturer's specifications.

FTP - Federal Test Procedures

SET - Congested Freeway Driving Schedule

HFET - Highway Fuel Economy Driving Schedule

TABLE 5. LABORATORY TEST SEQUENCE

1. Precondition, UDDS
2. Soak 12 to 20 hours
3. FTP - 4 bags for gaseous emissions
   2 filters or impinger samples
4. Soak 20 minutes - Fan off
5. Precondition first 505 seconds of UDDS
6. Idle 1 minute (±15 seconds)
   - (a) auto. trans. - drive
   - (b) start additional cooling blowers
   - (c) place filter holder in tunnel
7. SET - 1 bag sample
   1 filter or impinger sample
8. Engine Off - 10 minutes - Fan Off
9. HFET - 1 bag sample
   1 filter or impinger sample

NOTE: 5000 cfm fan on during all car operation. Additional tire and fuel tank cooling blowers on during all SET and HFET operation.

TABLE 6. SUMMARY OF DRIVING SCHEDULE PARAMETERS

Driving Schedule	Cycle	Duration, Seconds	Distance, Kilometers	Average Speed	
				km/hr	mph
FTP	505	505	5.8	--	--
	867	867	6.2	--	--
	UDDS	1372	12.0	31.4	19.5
SET	--	1398	21.7	56.0	34.8
HFET	--	765	16.5	77.6	48.2

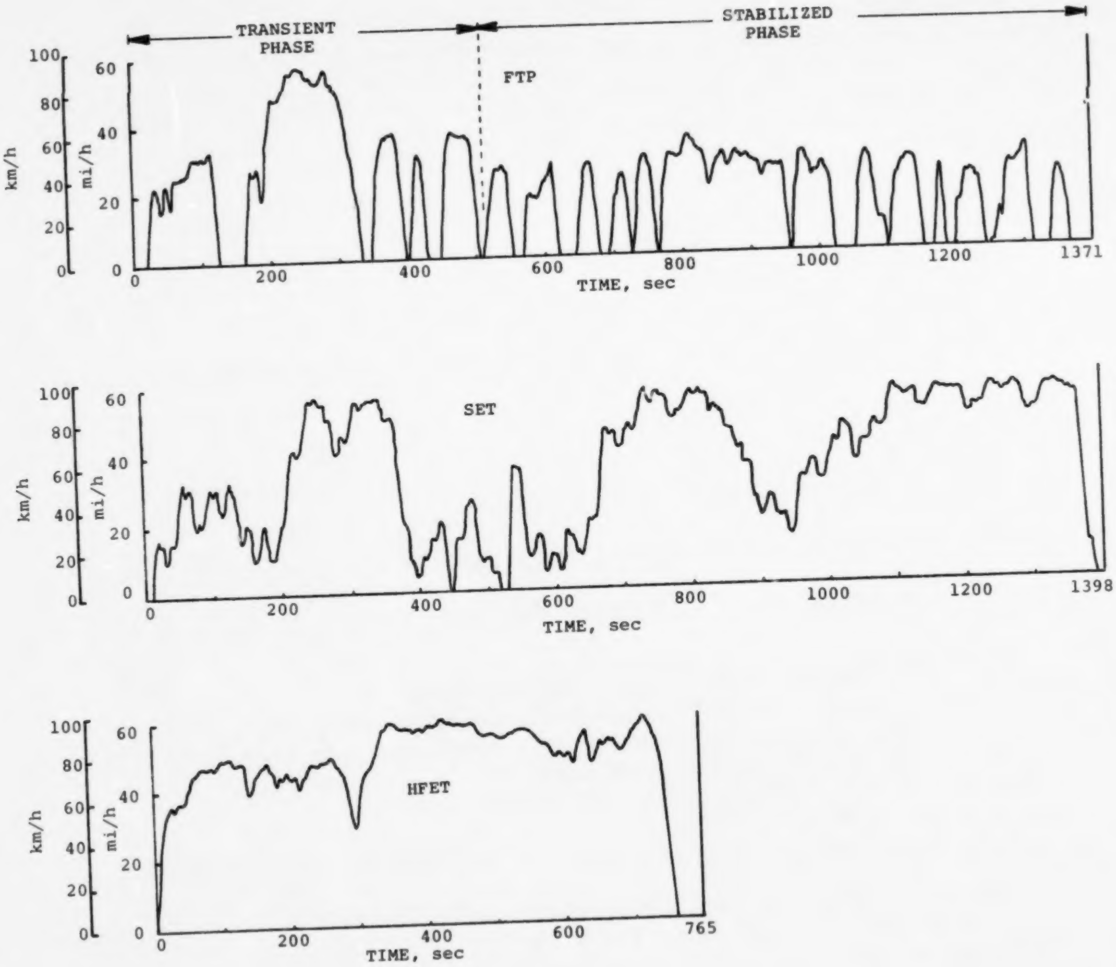


Figure 3. Driving cycle speed vs time traces

G. Test Numbering System

The numbering system, established for the various related unregulated emissions projects conducted at this laboratory, consists of six digits. One of the digits was not required for this project so a dash (-) was used in its place. The designation used for all vehicle testing was PVM-ST. The meaning of each letter or group of letters is described as follows:

	Description	As used for this project
PV	Vehicle Designation	
	P Project	7
	V Vehicle	1 through 4
M-	Condition Tested	
	M Malfunction	1 through 3
	- Space not used in this project	-
S	Test Series (Unmodified or Malfunction)	1 through 3*
T	Individual Test (FTP, SET or HFET)	1 through 3

The PV is used to identify the vehicle tested.

In this project, the test condition is sufficiently identified by one digit so the M, followed by a dash (-), was used to identify the specific malfunction conditions.

The S designates the test series where:

1 = Unmodified vehicle
2 & 3 = Initial and repeat test in a malfunction configuration

The T designates the individual test conducted where:

1 = FTP; 2 = SET; and, 3 = HFET

*In one or two special cases, a higher number was used to designate a rerun or an unplanned malfunction.

H. Short-Test Procedures

Regulated emissions were also evaluated over several I/M short-test procedures. These procedures are described by the data sheet in Appendix A-1 and are listed as follows:

- 50 mph Cruise Test
- 4-Mode Idle Tests
- Loaded 2-Mode Test
- Propane Gain Checks

All of these short-test procedures were conducted with the engine in a warmed-up operating condition. HC and CO emission rates were measured in all, except the propane gain checks. The propane gain checks involved determination of change in engine idle speed as propane was inducted into the intake of the engine.

I. Computational Methods

The methods used for calculating the unregulated emissions results are given in Appendix A-3. All regulated emissions were calculated using the methods prescribed in the Code of Federal Regulations for Light-Duty Vehicles.(6) On the computer printouts for the regulated emissions, included in Appendix D, all items of potential interest are identified by descriptive headings. Items on the computer sheet identified only by abbreviated headings are used in calculating the unregulated emissions.

III. ANALYTICAL PROCEDURES FOR UNREGULATED EMISSIONS

The analytical procedures used to measure the unregulated emissions are summarized in this section. A detailed description of most of the procedures, along with a discussion of their development, validation, and qualification, is available in Interim Report II, "Analytical Procedures for Characterizing Unregulated Pollutant Emissions from Motor Vehicles," developed in a related EPA Project.(5)

A. Description of the Analytical Procedures

The unregulated emissions evaluated in this project, along with the methods for sampling and the procedures used in the analyses, are listed in Table 7. Organic amines, aldehydes and ketones, organic sulfides, individual hydrocarbons, and metals and other elements represent groups of compounds. The respective procedures separate and identify a number of individual compounds within each of these groups. The analytical procedures involved in this project are briefly described as follows:

Organic Amines - The collection of organic amines (monomethylamine, monoethylamine and dimethylamines, trimethylamines, diethylamine, and triethylamine) is accomplished by bubbling CVS-diluted exhaust through glass impingers containing dilute sulfuric acid. The amines are complexed by the acid to form stable sulfate salts which remain in solution. A portion of this solution is then injected into a gas chromatograph equipped with an ascarite loaded pre-column and a nitrogen-phosphorus detector (NPD). External amine standards in dilute sulfuric acid are used to quantify the results.

Ammonia - Ammonia in CVS-diluted automotive exhaust is measured in the protonated form, NH_4^+, after collection in dilute H_2SO_4. The acidification is carried out in a glass impinger maintained at ice bath temperature. A sample from the impinger is then analyzed for ammonia in an Ion Chromatograph and the concentration in the exhaust is calculated by comparison to an ammonium sulfate standard solution.

Aldehydes and Ketones - The collection of aldehydes (formaldehyde, acetaldehyde and hexanaldehyde) and ketones (acetone and methylethylketone) is accomplished by bubbling CVS diluted exhaust through glass impingers containing 2,4-dinitrophenylhydrazine (DNPH) in dilute hydrochloric acid. The aldehydes and ketones (also known as carbonyl compounds) react with the DNPH to form their respective phenylhydrazone derivatives. These derivatives are insoluble or only slightly soluble in the DNPH/HCl solution and are removed by filtration followed by pentane extractions. The filtered precipitate and the pentane extracts are combined and then the pentane is evaporated in a vacuum oven. The remaining dried extract contains the phenylhydrazone derivatives. The extract is dissolved in a quantitative volume of toluene containing a known amount of anthracene as an internal standard. A portion of this dissolved extract is injected into a gas chromatograph and analyzed for several individual aldehydes and ketones, using a flame ionization detector.

TABLE 7. SAMPLING AND ANALYSIS METHODOLOGY FOR UNREGULATED EMISSIONS

Compound	Sampling	Method of Analysis
Organic Amines	Impinger	Gas chromatograph with ascarite pre-column and nitrogen-phosphorus detector (GC-NPD).
Ammonia (NH_3)	Impinger	Ion chromatograph.
Aldehydes & Ketones	Impinger	Dinitrophenylhydrazone derivative. Gas chromatograph with flame ionization detector (GC-FID).
Hydrogen Sulfide (H_2S)	Impinger	Methylene blue derivative. Spectrophotometer.
Total Cyanide [Hydrogen Cyanide (HCN) and Cyanogen (C_2H_2)]	Impinger	Cyanogen chloride derivative. Gas chromatograph with electron capture detector (GC-ECD).
Carbonyl Sulfide (COS) and Organic Sulfides	Trap	Gas chromatograph with flame photometric detector (GC-FPD).
Individual Hydrocarbons	Bag	Gas chromatograph with flame ionization detector (GC-FID).
Metals and Other Elements	Filter	Weighed using microbalance. Spectral X-ray analysis at RTP.
Particulates	Filter	Weighed using microbalance.
Sulfate	Filter	Barium chloranilate derivative (BCA). Liquid chromatograph with ultraviolet detector.
Leaded Fuel Components	Bag	Gas chromatograph with electron capture detector (GC-ECD).

Hydrogen Sulfide - The collection of hydrogen sulfide is accomplished by bubbling CVS-diluted exhaust through glass impingers containing a buffered zinc acetate solution which traps the sulfide ion as zinc sulfide. The absorbing solution is then treated with N,N-dimethyl-paraphenylene diamine sulfate and ferric ammonium sulfate. Cyclization occurs, forming the highly colored heterocyclic compound methylene blue (3,9-bisdimethylaminophenazothionium sulfate). The resulting solution is analyzed with a spectrophotometer at 667 nm in a 1-cm or 4-cm pathlength cell depending upon the concentration.

Total Cyanide (Hydrogen Cyanide plus Cyanogen) - The collection of total cyanide is accomplished by bubbling CVS-diluted exhaust through glass impingers containing a 1.0 N potassium hydroxide absorbing solution. This solution is maintained at ice bath temperature. An aliquot of the absorbing reagent is then treated with KH_2PO_4 and Chloramine-T. A portion of the resulting cyanogen chloride is injected into a gas chromatograph equipped with an electron capture detector (ECD). External CN^- standards are used to quantify the results.

Carbonyl and Organic Sulfides - The collection of carbonyl sulfide (COS) and the organic sulfides, methyl sulfide (dimethysulfide, $CH_3)_2S$), ethyl sulfide (diethylsulfide, $(C_2H_5)_2S$) and methyl disulfide (dimethyldisulfide, $(CH_3)_2S_2$), is accomplished by passing CVS-diluted exhaust through Tenax GC traps at -76°C. At this temperature the traps remove the organic sulfides from the dilute exhaust. The organic sulfides are thermally desorbed from the traps into a gas chromatograph sampling system and injected into a gas chromatograph equipped with a flame photometric detector for analysis. External organic sulfide standards generated from permeation tubes are used to quantify the results.

Individual Hydrocarbons - For measurement of selected individual hydrocarbons, methane (CH_4), ethane (C_2H_6), ethylene (C_2H_4), acetylene (C_2H_2), propane (C_3H_8), propylene (C_3H_6), benzene (C_6H_6), and toluene (C_7H_8), a sample of CVS-diluted exhaust is collected in a Tedlar bag. This bagged sample is then analyzed for individual hydrocarbons using a gas chromatographic system containing four separate columns and a flame ionization detector. The peak areas are compared to an external calibration blend and the individual hydrocarbon concentrations are obtained using a Hewlett-Packard 3354 computer system.

Metals and Other Elements - The metals are collected as particulate on a 47 mm Fluoropore filter, which is then sent to Research Triangle Park (RTP) for analysis by X-ray spectroscopy. The diluted exhaust sample is taken isokinetically from within the dilution tunnel. Weight gain on the filter is determined by weighing the filter on a microbalance before and after sampling.

Particulate - The "particulate" is collected isokinetically on a

47 mm glass fiber filter. The amount of "particulate" collected is determined by weighing the filter on a microbalance before and after sampling.

Sulfate - Automotive exhaust is vented into a dilution tunnel where it is mixed with a flowing stream of filtered room air. In the tunnel, the SO_3 reacts rapidly with water in the exhaust to form sulfuric acid aerosols. The aerosols grow to a filterable size range within the tunnel and are collected isokinetically on a fluorocarbon membrane filter. Particulate sulfate salts are also collected on the filter.

Sulfuric acid collected on the filter is then converted to ammonium sulfate by exposure to ammonia vapor. The soluble sulfates are leached from a filter with a measured volume of an isopropyl alcohol - water solution (60% IPA). A fixed volume of the sample extract is injected into a high pressure liquid chromatograph (HPLC) and pumped through a column of strong cation exchange resin in Ag^+ form to scrub out the halides (Cl^-,Br^-) and then through a column of strong cation exchange resin in H^+ form to scrub out the cations and convert the sulfate to sulfuric acid. Passage through a reactor column of barium chloranilate crystals precipitates out barium sulfate and releases the highly UV absorbing chloranilate ions. The amount of chloranilate ions released is equivalent to the sulfate in the sample and is measured by a sensitive liquid chromatograph UV detector at 310-313 nanometers. All the reactions and measurement take place in a flowing steam of 60% IPA. The scrubber and reactor columns also function as efficient filter media for any solid reaction products formed during passage of the sample through the column system.

Leaded Fuel Components - For measurement of the leaded fuel components tetraethyllead (TEL), tetramethyllead (TML), ethylene dibromide (EDB), and ethylene dichloride (EDC), a sample of CVS-diluted exhaust is collected in a Tedlar bag. Evaluation of this bagged sample is accomplished by direct analysis using a gas chromatograph equipped with an electron capture detector. This procedure is described in Appendix A-3.

B. Validation and Qualification of the Analytical Procedures

The analytical procedures used in this project were subjected to a series of validation and qualification experiments. Validation experiments for leaded fuel components were conducted in this project. For the other analytical procedures, the validation and qualification experiments were conducted in previous projects. Validation experiments included checks for sample stability, sample collection efficiency, detector linearity, interferences, and analysis repeatability. Qualification experiments included the injection of the compound of interest into the tunnel with and without the presence of exhaust and the subsequent recovery of that compound at the procedure sampling point.

Sample stability checks were performed using repeated analyses of the same sample at intervals over a specified period of time and comparing the results to the initial analysis. Organic amines, aldehydes and ketones, ammonia, total cyanide, nitrous oxide and individual hydrocarbon samples were found to be stable for several days. Carbonyl and organic sulfides and the hydrogen sulfide samples were found to be stable for approximately one day.

Sample collection efficiency experiments were performed by passing a known concentration of sample through a series of impingers or traps and analyzing each impinger or trap individually for the compound of interest. All of these procedures used in this project had a collection efficiency of 98% or better. Detector linearity experiments were performed by preparing several samples of various known concentrations and plotting the resulting peak areas versus the concentrations. The procedures had linear response over the range of interest in this project.

To determine interferences from other compounds, for each procedure, known exhaust components were introduced into the sample to determine their effect on the resultant measurements. To determine analysis repeatability, several samples of known concentrations were prepared and a number of complete analyses were performed at each concentration. The results of these tests were then compared to determine analysis repeatability.

The qualification experiments were performed to determine if the compounds of interest could travel the length of the dilution tunnel in the presence of dilute exhaust without significant loss by reaction with exhaust or the tunnel itself. The compounds were introduced at the same point at which the exhaust enters the tunnel and were sampled at the normal sampling point. Table 8 lists the procedures for which validation and qualification experiments have been performed.

C. Accuracy of the Analytical Procedures

A difficult, but very important, endeavor was the determination of procedural accuracy for each analytical method. The primary difficulty involved those procedures in which the exhaust compounds are trapped or absorbed, an extraction or subsequent reaction is performed, and then a portion of the extract is analyzed. After much consideration, in the previous malfunction projects, the decision was reached to initially define the accuracy in terms of a "minimum detection value" (MDV). The MDV, as used in this report, is defined as the value above which it can be said that the compound has been detected in the exhaust (i.e., at a measured value equal to the MDV, the accuracy is equal to plus or minus the MDV). Determination of accuracy over the entire range of each procedure was beyond the scope of these projects.

For compounds collected by bag samples, the MDV was determined from the instrument detection limits only and is independent of the sampling rate and duration. For compounds which are concentrated in impingers or traps, the MDV is dependent on the instrument detection limit, chemical workup, sampling rate and sampling duration. The MDV's listed in Table 9 were derived using the listed sampling rates and a 23-minute sampling period.

TABLE 8. PROCEDURAL VALIDATION AND QUALIFICATION

Compound or Compound Group	Validation Conducted	Qualification Conducted
Organic Amines	Yes	Yes (significant tunnel losses)
Ammonia	Yes	Yes (significant tunnel losses)
Aldehydes & Ketones	Yes	Yes
Hydrogen Sulfide	Yes	Yes
Total Cyanide	Yes	Yes
Carbonyl Sulfide and Organic Sulfides	Yes	Yes (significant tunnel losses)
Individual Hydrocarbons	Yes	No[a]
Metals and Other Elements	No[a]	No[a]
Particulates	No[a]	No[a]
Sulfate	No[a]	No[a]
Leaded Fuel Components	Yes	No

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[a] Established procedure

TABLE 9. EMISSION PROCEDURAL SAMPLE RATES AND ACCURACY

					Procedural Minimum Detection Values[a]		
		Mol. Weight	Sample Flow ℓ/100	$\mu g/m^3$ per ppm	ppm	μg/m	MDV for FTP,[b] mg/km
Test Number,	PVM-ST	--	--	--	--	--	--
Barometer,	mm Hg	--	--	--	--	--	--
Humidity,	g/kg	--	--	--	--	--	--
Temperature,	°C	--	--	--	--	--	--
Total Fuel Sulfur,	mg/km	--	--	--	--	--	--
Avg. Exh. Oxygen		32.00	--	--	--	--	--
Catalyst Avg. Temp.,	°C	--	--	--	--	--	--
Catalyst Max. Temp.,	°C	--	--	--	--	--	--
Carbon Dioxide,	g/km	44.01	Bag	--	--	--	--
Fuel Cons.,	ℓ/100 km	--	--	--	--	--	--
Regulated Emissions							
Hydrocarbons (THC)		11.88	Bag	575	1.0[c]	575	10
Carbon Monoxide		28.01	Bag	1165	2.0[c]	2330	40
Oxides of Nitrogen		46.01	Bag	1915	0.5[c]	958	16
Particulates							
Total Particulates		--	14.0	--	--	<50	<1
Sulfate		96.01	14.0	4000	<0.01	6	0.1
Compound Group Totals							
Aldehydes & Ketones		--	4.0	--	--	--	≃0.5
Individual Hydrocarbons		--	Bag	--	--	--	≃0.5
Organic Sulfides		--	0.13	--	--	--	≃0.05
Organic Amines		--	4.0	--	--	--	≃0.1
Other Compounds							
Ammonia		17.03	4.0	710	0.01	7	0.1
Cyanide & Cyanogen		26.02	4.0	1080	0.01	11	0.2
Hydrogen Sulfide		34.08	4.0	1415	0.01	14	0.2
Tetramethyllead		267	Bag	22	0.002	22	0.4
Ethylene Dichloride		99	Bag	21	0.005	21	0.4
Tetraethyllead		323	Bag	270	0.020	268	5.0
Ethylene Dibromide		188	Bag	39	0.005	39	0.7

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[a] Based on a 23-minute sampling period at the specified flow rate for all impinger, filter and trap collected samples.

[b] Based on $\mu g/m^3$ in the diluted exhaust and typical UDDS (FTP 505 and 866) parameters (1371 seconds, 206 m^3 CVS flow, 12.07 km, 0.98 DSFC) mg/km for FTP $\simeq \mu g/m^3 \times 206 \div 12.07 \times 0.98 \times 0.001 \simeq 0.0168 \times \mu g/m^3$.

[c] Based on the lowest instrument ranges used in this project.

TABLE 9 (Cont'd). EMISSION PROCEDURAL SAMPLE RATES AND ACCURACY

	Mol. Weight	CRC[d] Synonym	µg/m^3 per ppm	Procedural Minimum Detection Values[a]		MDV for FTP, mg/km[b]
				ppm	µg/m^3	
Aldehydes and Ketones						
Formaldehyde	30.03	--	1250	0.01	15	0.2
Acetaldehyde	44.05	--	1830	0.01	20	0.3
Acetone[e]	58.08	2-Propanone	2415	0.01	25	0.4
Methylethylketone	72.12	2-Butanone	3000	0.01	30	0.5
Hexanaldehyde	100.16	Hexanal	4165	0.01	40	0.7
Individual Hydrocarbons						
Methane	16.04	--	665	0.05	30	0.5
Ethylene	28.05	Ethene	1165	0.03	30	0.5
Ethane	30.07	--	1250	0.03	30	0.5
Acetylene	26.04	Ethyne	1085	0.03	30	0.5
Propane	44.11	--	1835	0.02	30	0.5
Propylene	42.08	Propene	1750	0.02	30	0.5
Benzene	78.12	--	3245	0.02	30	0.5
Toluene	92.15	--	3830	0.02	30	0.5
Organic Sulfides						
Carbonyl Sulfide	60.08	--	2500	0.001	3	0.04
Methyl Sulfide	62.13	Dimethyl	2585	0.001	3	0.04
Ethyl Sulfide	90.19	Diethyl	3750	0.001	4	0.06
Methyl Disulfide	94.20	Dimethyl	3915	0.001	4	0.06
Organic Amines						
Monomethylamine	31.06	Amino-Methane	1290	0.002	3	0.05
Monoethylamine[f]	45.09	Amino-Ethane	1875	0.002	4	0.05
Trimethylamine	59.11	--	2460	0.002	5	0.08
Diethylamine	73.14	--	3040	0.002	6	0.10
Triethylamine	101.19	--	4205	0.002	8	0.14

[a & b] See initial page of this table.

[d] Handbook of Chemistry and Physics, 54th Edition.

[e] Includes Acrolein - 56.07 and Propionaldehyde - 58.08 (CRC - Propenal and Propanal, respectively).

[f] Includes Dimethylamine - 45.09.

IV. CAR PREPARATION AND TESTING

Regulated and unregulated emissions from four 1970 model cars were measured with the cars operating in the unmodified and up to three malfunction conditions. This section describes these evaluations and presents the test results.

A. Car Preparation and Maintenance Record

As initially established, this project was to involve a minimum of car tune-up, maintenance and repair. Upon receipt of the cars, however, the scope of the tune-up was expanded. As the testing progressed, the scope of maintenance and repair was also expanded. Based on the experience of this project, and in a heavy-duty engine project involving older in-use engines (EPA Contract No. 68-03-2603), it is recommended that extensive tune-up, maintenance and repair be performed on all older in-use engines and vehicles prior to initiation of testing.

After receipt, each car was given a relatively minor tune-up and maintenance check. The results of these initial tune-ups and checks, along with subsequent maintenance and repairs, are summarized in Table 10. The conditions that occurred with the Chevrolet Monte Carlo and the Ford Fairlane directly affected some of the tests conducted, resulting in some unplanned malfunction conditions.

B. Malfunction Conditions Evaluated

Each of the four cars was to be evaluated in the unmodified and three malfunction conditions. These conditions are described as follows:

Test Number	Condition	Description
XXX-1	Unmodified	Engine tuned-up to manufacturer's specifications.
XX1-2,3	Rich Best Idle	Idle fuel mixture producing highest idle speed.
XX2-2,3	12% Misfire	Essentially random ignition misfire twelve percent of the total.
XX3-2,3	Lean Idle	Idle fuel-to-air mixture at which the extent of lean misfire remains barely acceptable.

In some cases, the rich and lean idle conditions were limited by internal limits in the carburetor and the condition described could not quite be attained. The twelve percent misfire was obtained using a misfire generator assembled and used in the previous malfunction projects.

TABLE 10. CAR TUNE-UPS, MAINTENANCE AND REPAIRS

	Oldsmobile	Dodge	Chevrolet	Ford
Car Number	71	72	73	74
Model	Delta 88	Challenger	Monte Carlo	Fairlane
Engine	455-8	225-6	350-8	302-8
As Received (As-SET):				
Ignition Timing	9°B(8°B)	2°B(TDC)	8°B(4°B)	3°A(--)[a]
Dwell	32°(30°)	44°(44°)	30°(30°)	21°(26°)
Idle RPM	1200(575)	620(750)	575(600)	550(600)
Idle HC, ppm	2300(185)	254(195)	260(260)	80(--)
Idle CO, %	0.03(0.2)	0.2(0.4)	0.1(0.1)	0.2(--)
Idle Vacuum	--(15)	--(18)	--(--)	--(16)
Battery	b	b	b	b
Choke	✓	✓	✓	✓
Plugs	✓	✓	✓	✓
PCV	✓	✓	✓	✓
Points	✓	✓	✓	✓
Coolant	✓	✓	✓	✓
Alternator	✓	✓	✓	✓
Air Filter	Dirty	✓	✓	✓
Fluid Levels:				
Engine Oil	✓	✓	✓	✓
Transmission	1 Pint Low	✓	4 Quarts Low[c]	✓
Differential	✓	1/2 Pint Low	✓	✓
Steering	✓	✓	✓	✓
Brakes	✓	✓	✓	✓
Initial Repairs:	Throttle Linkage Vacuum Hose Water Pump Trans. Cont. Spark[d]	Plug Wire Brakes		
Subsequent Repairs:			Accelerator Cable[e] Trans. Cont. Spark[d]	Timing[f]

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[a] 4°A mark was mistakenly taken to be 6°B.
[b] Batteries were recharged or replaced as required.
[c] Leaked at all seals.
[d] Vacuum lines were hooked up incorrectly.
[e] Did not enable W.O.T. operation.
[f] Ignition timing marks were cleared and timing set at 6°B.

The actual conditions evaluated are briefly described as follows:

Test Number	Malfunction Description
Oldsmobile Delta 88:	
711-X	Rich Best Idle Series
712-1,2,4	12% Ignition Misfire Series
712-3*	12% Misfire plus Unknown Malfunction
Dodge Challenger:	
721-X	Rich Best Idle Series
722-X	12% Misfire Series
723-X	Lean Idle Series
Chevrolet Monte Carlo:	
731-1,3,4	Rich Best Idle Series
731-2*	Rich Best Idle plus TCS not Functioning
732-1*	Trans. Cont. Spark not Functioning
732-2,3*	12% Misfire plus TCS not Functioning
733-1	Unmodified (Repeat in place of 732-1)
Ford Fairlane:	
741-X	Rich Best Idle Series
742-1*	Ignition Timing 10° Retard
742-2,3*	12% Misfire plus Timing 10° Retard
743-X	Lean Idle Series
744-1	Unmodified (Repeat in place of 742-1)

*Unplanned malfunction condition.

Tests identified with a -1 designate a planned unmodified condition and those identified with a -2 or higher designate a planned specific malfunction condition. The asterisk designates an unplanned malfunction. There were a total of eight test sequences with unplanned malfunction conditions. Most of these were associated with malfunction conditions which went undetected through the minor tune-up and maintenance checks. This illustrates a need for extensive tune-up and maintenance checks when evaluating older in-use vehicles.

C. Regulated and Unregulated Emissions Tests Results

Summaries of the test results are included in Appendix B. Individual sample data for the FTP evaluations are included in Appendix C and the cumputer printouts for the regulated emissions are included in Appendix D. The analyses and discussion of these test results are included in Section V of this report. All FTP unregulated emissions data are based on appropriately weighted four-cycle FTP results.

In the data tables, a double dash (--) has been used when no test data were available. This occurs for unregulated emissions when valid test data could not be obtained due to instrument malfunction or loss of the sample.

D. I/M Short-Test Procedure Results

Each car was evaluated over four short-tests after each emissions test sequence. Three of the short-tests involved measurement of HC and CO under steady-state operating conditions. The other short-test involved determination of maximum engine speed at idle with propane injection into the intake of the engine. The HC and CO emission analyzers used are in a Beckman cart which was initially designed for and used in nine-mode heavy-duty engine evaluations. HC was measured as ppm hexane.

The results of the short-test evaluations are reported in Appendix E and are summarized in Table 11. In general, the rich idle condition produced high CO at idle and the lean idle produced high HC at idle. The twelve percent misfire condition produced high HC in all of the modes evaluated. The malfunction configurations were also correctly reflected by the results of the propane enrichment evaluations. The increase in engine speed was large at the lean idle condition and negligible at the rich idle condition.

E. Other Evaluations

In the evaluations with Car 74, particulates were determined using both glass fiber and Pallflex filters. Results of these evaluations are summarized in Table 12. In all tests, more total particulates were collected on the glass fiber filters than on the Pallflex filters. This ratio of GF/PF was highest for the FTP, with an overall average of 1.9, and lowest for the SET, with an overall average 1.4. No further evaluations were conducted using Pallflex filters. To enable direct comparisons with results obtained in the previous malfunction projects, results obtained using glass fiber filters are reported in the summary tables.

TABLE 11. SUMMARY OF I/M SHORT TEST RESULTS

	Undiluted Exhaust Emissions							
	HC Emissions, ppm Hexane				CO Emissions, Percent			
	Unmod.	Rich	Misfire	Lean	Unmod.	Rich	Misfire	Lean
Car 71								
Idle	130	210	1340	--	0.1	5.1	0.1	--
2500 rpm	110	145	1200	--	0.3	0.4	0.4	--
30 mph	160	205	1525	--	0.3	0.8	0.4	--
50 mph	165	180	1480	--	0.5	0.8	0.3	--
Car 72								
Idle	210	420	1700	1900	0.4	7.2	0.5	0.2
2500 rpm	190	250	1500	420	0.2	0.2	0.2	0.3
30 mph	250	340	1680	400	0.1	0.5	0.2	0.1
50 mph	210	240	1460	290	0.2	0.2	0.3	0.8
Car 73								
Idle	155	280	1470	--	0.1	6.1	0.1	--
2500 rpm	120	135	1310	--	0.5	0.7	0.5	--
30 mph	210	325	1400	--	0.1	0.6	0.1	--
50 mph	210	235	1460	--	0.6	0.8	0.4	--
Car 74								
Idle	250	450	1400	1600	0.2	9.0	0.1	0.2
2500 rpm	100	150	1300	300	0.3	0.3	0.3	0.3
30 mph	200	400	1500	300	0.1	0.4	0.1	0.1
50 mph	200	200	1500	200	0.4	0.5	0.4	0.4

		Idle Propane Enrichment, rpm Increase			
Car	Gear	Unmod.	Rich	Misfire	Lean
71	Neutral	120	0	110	--
72	Neutral	110	0	100[a]	960
73	Neutral	180	0	170	--
74	Neutral	150	0	150	650
71	Drive	60	0	60	--
72	N.A.	--	--	--	--
73	Drive	70	0	60	--
74	Drive	60	0	80	230

[a] Without vacuum advance.

Car 71 - 1970 Oldsmobile Delta 88
Car 72 - 1970 Dodge Challenger
Car 73 - 1970 Chevrolet Monte Carlo
Car 74 - 1970 Ford Fairlane

TABLE 12. COMPARISON OF PALLFLEX AND GLASS FIBER FILTERS
Car 74 - 1970 Ford Fairlane

	Total Particulates, mg/km								
	FTP			SET			HFET		
	GF		PF	GF		PF	GF		PF
741-1	119		50	70		64	90		83
742-1	86		44	76		55	64		36
743-1	82		44	89		70	64		45
Avg.	96		46	78		63	73		55
GF/PF		2.09			1.23			1.33	
741-2	116		58	118		81	110		63
741-3	106		63	86		60	91		56
Avg/	111		61	102		71	101		60
GF/PF		1.82			1.44			1.68	
742-2	88		48	85		68	79		45
742-3	94		48	97		69	81		47
Avg.	91		48	91		69	80		46
GF/PF		1.90			1.32			1.74	
743-2	186		103	125		80	123		65
743-2	173		92	124		79	116		53
Avg.	180		98	125		80	120		59
GF/PF		1.84			1.56			2.03	

	FTP			SET			HFET		
	Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
GF/PF	1.8	2.1	1.9	1.2	1.6	1.4	1.3	2.0	1.7

V. ANALYSES OF THE RESULTS

This section reports the analyses performed on the emissions data generated in this project. These analyses involved averaging and reformatting to enable making various comparisons of the data. Due to the very limited number of data points for each emission at each specific condition, advanced statistical analyses were judged to be inapplicable. In addition to presenting these data in formats that enable ready review and comparison, these results are also compared with results obtained in several previous related projects.

A. Average Emissions Values

The initial analyses of these data involved averaging of the results for each of the configurations evaluated, and these data are given in Appendix F. A summary of emission rates, of selected compounds measured in the unmodified configuration (i.e., tuned-up to manufacturer's specifications), is given in Table 13. With few exceptions, these emission rates were reasonably consistent between the four cars tested, based on the experience from the previous projects. Leaded fuel components (TML, EDC, TEL and EDB) were not detected in any of the evaluations in the unmodified configuration.

B. Regulated Emissions and Fuel Consumption

The analyses of the regulated emissions and fuel consumption results were straightforward, since test-to-test repeatability was generally good. A summary of the FTP regulated emissions and fuel consumption data, for all configurations tested, is presented in Table 14. In general, rich idle significantly increased CO, twelve percent misfire greatly increased HC, and lean idle produced some increase in HC. The fuel consumption varied greatly between the four cars tested in the unmodified configuration. This variation in fuel consumption was expected, since these cars differed greatly in inertia weight and engine size.

C. General Effects of Malfunctions on Emissions

An evaluation that can provide some insight is whether the respective malfunctions caused increases in emissions relative to the unmodified configuration. The results of such an evaluation for the FTP results are summarized in Table 15. The rich idle and the twelve percent misfire malfunction configurations produced more significant increases than were produced with lean idle.

D. Other Elements

A summary of the elemental analyses results, for the FTP, is presented in Table 16. The cars evaluated in this project produced relatively significant emission rates of lead, bromine and chlorine in all configurations. These compounds apparently resulted from the use of the leaded fuel. Emissions of iron were increased with the twelve percent misfire configuration.

TABLE 13. AVERAGE VALUES FOR THE UNMODIFIED CONFIGURATION

	Emissions in mg/km, Except as Noted											
	FTP				SET				HFET			
	Car 71	Car 72	Car 73	Car 74	Car 71	Car 72	Car 73	Car 74	Car 71	Car 72	Car 73	Car 74
Regulated Emissions												
Hydrocarbons, (THC), g/km	1.43	1.71	2.05	2.35	0.91	0.87	1.23	1.63	0.95	0.68	1.26	1.59
Carbon Monoxide, g/km	17.9	19.3	18.1	13.0	5.86	5.79	5.06	6.06	5.36	3.33	5.44	5.69
Oxides of Nitrogen, g/km	2.23	1.91	2.64	3.66	2.98	2.55	3.24	4.33	3.18	2.74	3.58	4.24
Particulates												
Total Particulates	101.	82.	115.	96.	68.	51.	68.	79.	69.	49.	80.	73.
Sulfate	0.68	0.47	1.11	0.27	0.43	0.28	0.29	0.49	0.39	0.25	0.62	0.31
Compound Group Totals												
Aldehydes & Ketones	37.3	12.8	73.5	22.8	32.2	11.6	37.6[a]	16.3	27.0	9.0	34.8	27.0
Individual Hydrocarbons	699.	719.	790.	849.	444.	364.	524.	674.	372.	243.	542.	670.
Organic Sulfides	0.08	0.01	0.22	0.00	0.03	0.03	0.10	0.00	0.02	0.00	0.06	0.00
Organic Amines	0.08	0.03	0.03	0.04	0.01	0.04	0.06	0.01	0.10	0.03	0.04	0.00
Other Compounds[a]												
Ammonia	3.82	2.90	5.72	4.78	2.33	1.67	2.70	2.78	5.42	1.69	2.58	5.63
Cyanide & Cyanogen	3.45	5.20	3.60	0.88	1.80	3.00	1.69	1.66	6.69	6.97	4.57	5.14
Hydrogen Sulfide	0.08	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Leaded Fuel Components[b]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Car 71 - 1970 Oldsmobile Delta 88
Car 72 - 1970 Dodge Challenger
Car 73 - 1970 Chevrolet Monte Carlo
Car 74 - 1970 Ford Fairlane

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[a] Single data point.
[b] Includes tetramethyllead, ethylene dichloride, tetraethyllead and ethylene dibromide.

TABLE 14. SUMMARY OF AVERAGE FTP REGULATED EMISSIONS AND FUEL CONSUMPTION DATA

		Malfunction		
	Unmodified	Rich Idle	12% Misfire	Lean Idle
Car 71, Oldsmobile				
Hydrocarbon, g/km	1.4	2.0	15.2	--
Carbon Monoxide, g/km	17.6	40.0	15.8	--
Oxides of Nitrogen, g/km	2.2	2.2	2.8	--
Fuel Consumption, ℓ/100 km	20.7	20.8	21.4	--
Car 72, Dodge				
Hydrocarbon, g/km	1.7	2.3	9.6	3.3
Carbon Monoxide, g/km	19.3	36.1	22.1	16.2
Oxides of Nitrogen, g/km	1.9	1.8	2.1	1.8
Fuel Consumption, ℓ/100 km	12.5	12.9	13.2	12.6
Car 73, Chevrolet				
Hydrocarbon, g/km	2.1	2.9	14.0	--
Carbon Monoxide, g/km	18.1	51.9	13.8	--
Oxides of Nitrogen, g/km	2.6	2.3	1.9	--
Fuel Consumption, ℓ/100 km	17.8	18.2	19.1	--
Car 74, Ford				
Hydrocarbon, g/km	2.4	3.8	14.9[a]	3.3
Carbon Monoxide, g/km	13.0	50.1	16.9[a]	9.6
Oxides of Nitrogen, g/km	3.7	3.3	3.4[a]	3.7
Fuel Consumption, ℓ/100 km	16.3	18.0	19.1[a]	16.0

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[a] 12% misfire plus 10 degrees ignition retard.

TABLE 15. RELATIONSHIP OF MALFUNCTION TO UNMODIFIED FTP EMISSION RESULTS

	Number of Cars for Which Emissions Increased Out of the Total Cars Evaluated in that Configuration		
	Rich Idle	12% Misfire	Lean Idle
Regulated Emissions			
Hydrocarbons, (THC), g/km	4/4	4/4[a]	2/2
Carbon Monoxide, g/km	4/4[a]	2/4[b]	0/2
Oxides of Nitrogen, g/km	0/4	2/4[b]	0/2
Particulates			
Total Particulates	2/4[b]	4/4	0/2
Sulfate	2/4[b]	2/4	2/2[b]
Compound Group Totals			
Aldehydes & Ketones	3/4[b]	4/4[a]	1/2
Organic Sulfides	1/4[b]	2/4[b]	2/2[b]
Organic Amines	3/4[b]	2/4[b]	1/2[b]
Other Compounds			
Ammonia	1/4	2/4	1/2[b]
Cyanide & Cyanogen	4/4	0/4	1/2
Hydrogen Sulfide	0/4	0/4	0/2
Other Elements[c]			

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[a] Over 100 percent increase.

[b] Changes were relatively minor and/or inconsistent.

[c] Discussed separately.

TABLE 16. SUMMARY OF THE ELEMENTAL ANALYSES RESULTS FOR THE FTP

	Exhaust Emission, mg/km								
Test	**Pb**	**Br**	**P**	**Al**	**S**	**Cl**	**Zn**	**Fe**	**Ca**
71U	19.7	12.7	0.1	0.1	0.2	7.6		2.2	0.1
711	17.1	9.9	0.1			6.4		0.2	0.1
712	33.1	15.6	0.1	0.1	0.6	5.7		4.5	0.1
72U	15.0	6.6	0.1		0.2	4.4	0.2	4.8	0.1
721	10.3	4.5	0.1		0.1	2.3	0.4	0.7	
722	15.7	6.2	0.1		0.2	3.9	0.2	3.3	
723	14.3	6.7	0.1		0.1	3.0	0.1	0.4	
73U	20.3	8.9	0.2	0.2	0.5	2.5	0.1	3.4	0.1
731	16.6	7.7	0.1	0.3	0.4	2.5		1.2	
732	35.4	13.2	0.2	0.4	1.3	3.2	0.3	15.2	0.3
74U	19.4	8.8	0.2		0.1	3.7	0.1	0.6	0.2
741	25.0	11.3	0.2		0.2	6.7	0.1	1.1	0.2
742	33.4	13.1	0.3	0.1	0.8	4.9	0.2	12.6	0.2
743	19.3	9.1	0.2		0.1	3.3	0.1	0.3	0.2

Pb - Lead
Br - Bromine
P - Phosphorus

Al - Aluminum
S - Sulfur
Cl - Chlorine

Zn - Zinc
Fe - Iron
Ca - Calcium

Test	Description
7XU	Unmodified Configuration
7X1	Rich Idle
7X2	12% Ignition Misfire
7X3	Lean Idle

Note: Compounds not included in this table had rates which never exceeded 0.14. All blanks in the table represent values less that 0.05.

E. Maximum Emission Values

The maximum emissions values for all four cars were determined and these data are presented in Table 17. The data listed in Table 17 are the highest of the averaged emission rates obtained with any of the four cars. These data are listed separately for the unmodified and for the malfunction configurations. The last pages of Table 17 identify the car test which produced this maximum value.

Table 17 is intended to provide some insight into which compounds may be of potential concern. After "threshold levels for concern" are established for the unregulated emissions, this table will enable ready screening to determine which of the unregulated emissions may be a potential cause for concern; and perhaps aid in setting priorities for further investigation into possible hazardous toxicity effects. Further review of the results given in Appendices B and F would then be required to extablish whether or not concern is actually justified.

F. Relative Importance of the Maximum Emission Rates

There are established automotive source emission standards for HC, CO, NO_x and diesel particulate. Such standards can be utilized in a comparative analyses of the emission results for those compounds. For the other compounds evaluated, however, attempted analyses of relative importance require the application of some other available criteria.

The criteria utilized in the previous malfunction projects were the Threshold Limit Values (TLV) and the procedure used was described in the final report for the initial project.(1) In brief, the criteria and procedure are described as follows:

> The maximum emission rates (MER) are converted to an equivalent maximum emission concentration (MEC) in the undiluted exhaust for the car having the lowest fuel consumption. This MEC is then compared to the TLV. The TLV is the limit established by OSHA for exposure by a worker in any eight-hour work shift.

The conversion from an emission rate in g/km to mg/m^3 was determined by the total volume of the undiluted exhaust and the total distance driven for each test. The volume of undiluted exhaust differs for each malfunction condition; generally as a function of the fuel consumption rate. In converting these data, a relationship was used which tends to correct all data to an equivalent undiluted exhaust flow rate equal to the lowest for any of the configurations evaluated. This was done in order to equalize the data to a common basis and eliminate the relative reduction obtained by configurations having high exhaust flow rates. The EPA has found this approach, for evaluating the unregulated emissions, to be of value for preliminary screening purposes.

TABLE 17. HIGHEST OF THE AVERAGED EMISSION RATES

	Emission Rate, mg/km (Except as Noted)					
	FTP		SET		HFET	
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.
Regulated Emissions						
Hydrocarbons (THC), g/km	2.35	15.22	1.63	11.63	1.59	10.06
Carbon Monoxide, g/km	19.31	51.93	6.06	21.83	5.69	9.31
Oxides of Nitrogen, g/km	3.66	3.74	4.33	4.71	4.24	4.34
Particulates						
Total Particulates	114.55	222.29	78.53	144.61	80.23	119.78
Sulfate	1.11	2.50	0.49	1.49	0.62	1.11
Compound Group Totals						
Aldehydes & Ketones	73.5	254.5	37.6*	166.3	34.8	199.7
Individual Hydrocarbons	848.7	3566.4	674.3	2790.4	670.2	2492.3
Organic Sulfides	0.22	0.26	0.10	0.06	0.06	0.11
Organic Amines	0.08	0.40	0.10	0.35	0.10	0.28
Other Compounds						
Ammonia	5.72	16.60	2.78	10.64	5.63	10.18
Cyanide & Cyanogen	5.20	9.92	3.00	5.33	6.97	8.63
Hydrogen Sulfide	0.08	0.05	0.00	0.00	0.00	0.00
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	3.81	0.00	3.65	0.00	3.64
Aldehydes & Ketones						
Formaldehyde	66.77	206.24	34.77	136.53	30.87	173.17
Acetaldehyde	6.74	34.29	4.88	20.28	3.98	19.08
Acetone	0.71	12.05	0.35	6.21	0.20	5.91
Isobutyraldehyde	--	--	--	--	--	--
Methyl Ethyl Ketone	0.27	3.71	0.14	2.20	0.23	1.54
Hexanaldehyde	0.00	2.54	0.00	2.27	0.00	1.14
Individual Hydrocarbons						
Methane	98.72	352.98	52.39	133.09	51.29	79.69
Ethylene	247.81	368.66	208.62	386.31	207.63	352.88
Ethane	23.30	32.42	19.07	31.13	19.71	29.41
Acetylene	133.11	344.26	62.59	142.59	71.32	102.79
Propane	5.96	8.17	1.68	5.77	1.48	6.66
Propylene	132.21	260.04	108.27	281.85	105.40	252.48
Benzene	56.94	200.55	48.12	174.63	48.04	104.35
Toluene	235.15	2496.99	173.53	1769.45	165.40	1573.80

*One run only

TABLE 17 (Cont'd). HIGHEST OF THE AVERAGED EMISSION RATES

	Emission Rate, mg/km (Except as Noted)					
	FTP		SET		HFET	
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.
Organic Sulfides						
Carbonyl Sulfide	0.18	0.26	0.08	0.06	0.03	0.07
Methyl Sulfide	0.04	0.10	0.02	0.01	0.03	0.04
Ethyl Sulfide	0.01	0.01	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.01	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.08	0.37	0.07	0.35	0.09	0.18
Monoethylamine	0.02	0.12	0.02	0.04	0.01	0.10
Trimethylamine	0.01	0.02	0.02	0.00	0.01	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trace Elements[a]						
Lead	20.26	35.38	30.80	25.02	17.50	25.08
Bromine	12.68	15.64	17.45	18.65	13.04	15.23
Phosphorus	0.23	0.28	0.28	0.23	0.17	0.15
Silicon	0.01	0.02	0.02	0.00	0.00	0.00
Cadmium	0.01	0.02	0.02	0.02	0.01	0.02
Aluminum	0.22	0.36	0.15	0.48	0.05	0.17
Sulfur	0.53	1.28	0.18	0.89	0.10	0.54
Sodium	0.06	0.11	0.13	0.11	0.06	0.32
Magnesium	0.02	0.05	0.04	0.04	0.02	0.02
Chlorine	7.58	6.69	6.52	5.97	6.44	7.91
Zinc	0.17	0.26	0.22	0.14	0.12	0.15
Copper	0.01	0.05	0.03	0.02	0.00	0.04
Nickel	0.00	0.00	0.00	0.00	0.00	0.00
Iron	4.75	15.23	2.17	20.32	1.23	5.63
Vanadium	0.01	0.01	0.01	0.01	--	0.01
Calcium	0.18	0.29	0.25	0.18	0.07	0.08

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[a] This table excludes elements having measured emissions values consistently below 0.01 mg/km.

TABLE 17 (Cont'd). HIGHEST OF THE AVERAGED EMISSION RATES

	Car Test Number					
	FTP		SET		HFET	
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.
Organic Sulfides						
Carbonyl Sulfide	73	741	73	742	73	742
Methyl Sulfide	73	732	71, 73	742,731	73	742
Ethyl Sulfide	71, 73	711,731	All	All	All	All
Methyl Disulfide	--	731	All	All	All	All
Organic Amines						
Monomethylamine	71	712	71	712	71	731
Monoethylamine	74	711	71	721	71,72,73	731
Trinethylamine	72	711	71	All	73	All
Diethylamine	--	All	All	All	All	All
Triethylamine	--	All	All	All	All	All
Trace Elements[a]						
Lead	73	732	74	712	74	741
Bromine	71	712	74	743	71	741
Phosphorus	74	742	74	743	73	742
Silicon	71	711,712,742	73	All	All	All
Cadmium	71,72	712	71,74	741,743,712	71,72,74	741
Aluminum	73	732	73	732	71,73	732
Sulfur	73	732	74	732	73	732
Sodium	71,72	732	74	743,732	71,74	742
Magnesium	71,73,74	732	74	732	73,74	712,732, 741,742, 743
Chlorine	71	741	74	741	72	721
Zinc	72	732	74	743	71	732
Copper	71,72	732	71	732,743	All	742
Nickel	All	All	All	All	All	All
Iron	72	732	73	732	73	732
Vanadium	71,73	711,721,732	73	732	All	711,712, 721,731, 741
Calcium	74	732	74	743	73	743

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[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

TABLE 17 (Cont'd). HIGHEST OF THE AVERAGED EMISSION RATES

	Car Test Number					
	FTP		SET		HFET	
	Unmod.	Malf.	Unmod.	Malf.	Unmod.	Malf.
Regulated Emissions						
Hydrocarbons (THC), g/km	74	712	74	742	74	742
Carbon Monoxide, g/km	72	731	74	741	74	741
Oxides of Nitrogen, g/km	71	743	74	743	74	743
Particulates						
Total Particulates	73	732	74	732	73	742
Sulfate	73	732	74	732	73	732
Compound Group Totals						
Aldehydes & Ketones	73	712	73	712	73	732
Individual Hydrocarbons	74	742	74	742	74	742
Organic Sulfides	73	741	73	742	73	742
Organic Amines	71	712	71	712	71	731
Other Compounds						
Ammonia	73	742	74	742	74	742
Cyanide & Cyanogen	72	721	72	721	72	721
Hydrogen Sulfide	71	711, 731	All	All	All	All
Tetramethyllead	All	All	All	All	All	All
Ethylene Dichloride	All	All	All	All	All	All
Tetraethyllead	All	All	All	All	All	All
Ethylene Dibromide	All	742	All	742	All	742
Aldehydes & Ketones						
Formaldehyde	73	712	73	732	73	732
Acetaldehyde	73	732	71	712	71	732
Acetone	71	732	71	712	74	732
Isobutyraldehyde	--	--	--	--	--	--
Methyl Ethyl Ketone	71	712	71	712	73	732
Hexanaldehyde	--	712	All	712	All	722
Individual Hydrocarbons						
Methane	72	741	74	741	74	741
Ethylene	74	741	74	742	74	742
Ethane	74	741	74	742	74	742
Acetylene	72	741	74	741	74	741
Propane	73	711	74	742	74	742
Propylene	74	742	74	742	74	742
Benzene	73	732	74	712	74	732
Toluene	74	732	74	742	74	742

The maximum emission rates are summarized and compared to the emissions standards and the TLV in Table 18. This table also includes several overall average emission rates for all four of the cars in the unmodified configuration. These values summarized in Table 18 are intended to provide some idea of the relative importance, based on toxicity, for some of the compounds evaluated. It should be emphasized, however, that definite conclusions are currently inappropriate for any compounds, except possibly those for which automotive source emission standards have been established. It should be recognized that the hazard level of a compound may change based on new findings in health effects research. This is especially a factor when a compound is changed from a toxic concern to a carcinogenic concern, such as is apparently occurring with formaldehyde. In the initial project, the ambient air standards were also reviewed for possible inclusion. Due to the varied ways in which the standards are expressed, however, there did not appear to be an appropriate method for including such standards in these comparative analyses.

There was no TLV available for leaded fuel-derived particulates. The value used in Table 18 for particulates was adapted from TLV values for other types of particulates. Direct applicability to particulates derived from leaded fuels is not known.

On the basis of the comparisons of the maximum and the overall average emissions rates to the emissions standards and to the threshold limit values, the currently regulated HC, CO and NO_x emissions appeared to be the most significant. Next in significance appear to be particulates (which included a significant amount of lead compounds) and formaldehyde. The EPA is currently evaluating the significance of the unregulated emissions as measured in this and other projects.

G. Comparison of Results with Previous Projects

Four 1970 model cars were evaluated in this project. Cars evaluated in previous projects have included: one 1977 non-catalyst car, four 1978 cars with an oxidation catalyst, and four 1978 or 1979 cars with a three-way catalyst. This section of the report compares selected average and maximum emissions values for each of these car groupings. These comparative data are presented in Table 19.

Average Emissions Rates - The average rates for the unmodified configuration are given in the upper half of Table 19. Hydrocarbons, carbon monoxide, particulates, aldehydes, and cyanides were significantly higher from the non-catalyst cars than from the cars with a catalyst. Ammonia was highest from the three-way catalyst cars. The three-way catalyst cars, however, had the lowest emissions rates for all three of the regulated emissions (HC, CO, and NO_x). With all of these cars, there were relatively insignificant emission rates of sulfates, organic amines, organic sulfides, and hydrogen sulfide.

TABLE 18. RELATIVE IMPORTANCE OF THE FTP EMISSION RATES

	Maximum Emission Rates in Any Configuration					
	Maximum Emission Rate (MER) in mg/km	Emission Standard for 1985 in mg/km	Equivalent MER in Undiluted Exhaust in mg/m^3(MEC)[a]	Threshold Limit Value (TLV) in mg/m^3		Ratio of MEC to TLV
				OSHA(9)	R[b]	
Regulated Emissions						
Hydrocarbons	15,200	255	11,400	--	--	--
Carbon Monoxide	59,000	2,113	44,000	55	--	800
Oxides of Nitrogen	3,700	622	2,800	9	--	300
Particulates						
Total Particulates	222	124[c]	165	--	1[d]	165[d]
Sulfate	3	--	2	--	-	2
Compound Group Totals						
Aldehydes & Ketones	255	--	190	--	--	--
Organic Sulfides	<1	--	<1	--	10	<1
Organic Amines	<1	--	<1	--	>10	<1
Other Compounds						
Ammonia	17	--	13	35	--	1
Cyanide & Cyanogen	10	--	8	--	5	2
Hydrogen Sulfide	<1	--	<1	--	10	<1
Formaldehyde	210	--	160	4	--	40

	Overall Average Emission Rates in the Unmodified Configuration					
	Average Emission Rate (AER) in mg/km	Emission Standard for 1983 in mg/km	Estimated AER in Undiluted Exhaust in mg/m^3(AEC)	Threshold Limit Value (TLV) in mg/m^3		Ratio of AEC to TLV
				OSHA(9)	R[b]	
Regulated Emissions						
Hydrocarbons	1,900	255	1,400	--	--	--
Carbon Monoxide	17,100	2,113	12,800	55	--	230
Oxides of Nitrogen	2,600	622	1,950	9	--	220
Other Emissions						
Total Particulates	99	124	75	--	1[d]	75[d]
Formaldehyde	35	--	26	4	--	7

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[a] Derived on a wet basis using the following approximate calculation: mg/m^3 = Conversion Factor × mg/km. C.F. = Distance/Total Volume × Dilution Factor

[b] Based on values for some similar or related compounds as set by OSHA(9) or recommended by the 1968 American Conference of Governmental Industrial Hygienists(10).

[c] Value for diesel cars.

[d] TLV used may not be applicable to particulates formed from leaded fuel.

TABLE 19. COMPARISON WITH RESULTS FROM PREVIOUS PROJECTS

	Average FTP Emission Rates in the Unmod. Conf., mg/km			
	Non-Catalyst		Oxid. Cat.	3-Way Cat.
	1970[a,b]	1977[a]	1978[a]	1978 & 79[a]
Regulated Emissions				
Hydrocarbons	1,900	730	280	120
Carbon Monoxide	17,100	11,100	3,150	1,900
Oxides of Nitrogen	2,600	1,210	860	480
Particulates				
Total Particulates	99[b]	31	6	9
Sulfates	<1	<1	<1	1
Compound Group Totals				
Aldehydes & Ketones	37	13	3	1
Organic Sulfides	<1	<1	<1	<1
Organic Amines	<1	<1	<1	<1
Other Compounds				
Ammonia	4	3	3	21
Cyanide & Cyanogen	3	2	<1	<1
Hydrogen Sulfide	<1	<1	<1	<1
	Maximum Emissions Rates, mg/km[c,d]			
Regulated Emissions				
Hydrocarbons	15,200	10,800	2,200	2,150
Carbon Monoxide	59,000	24,700	52,900	57,500
Oxides of Nitrogen	3,700	2,250	4,200	2,500
Particulates				
Total Particulates	222[b]	48	18	29
Sulfates	3	4	17	27
Compound Group Totals				
Aldehydes & Ketones	255	228	13	6
Organic Sulfides	<1	<1	2	6
Organic Amines	<1	<1	<1	<1
Other Compounds				
Ammonia	17	3	57	318
Cyanide & Cyanogen	10	7	6	112
Hydrogen Sulfide	<1	<1	4	7

---

[a] Data for four 1970 model cars are from this project. Data for one 1977 non-catalyst, four oxidation catalyst, and four 3-way catalyst cars are from previous contracts, 68-03-2499, 68-03-2588 and 68-03-2692.

[b] Leaded fuel used in the 1970 cars and unleaded fuel in all others.

[c] The highest of the average values were used in this comparison.

[d] FTP results were used for the regulated emissions.

Maximum Emission Rates - The maximum emissions rates for all configurations evaluated are given in the lower half of Table 19. The cars with a catalyst produced significantly lower rates of hydrocarbons and aldehydes and significantly higher rates of sulfates, ammonia and organic sulfides. The three-way catalyst cars produced ammonia and cyanide emission rates which were an order of magnitude, or more, higher than the rates from the other car groups.

Summary of the Comparisons - With the cars in the unmodified configuration (tuned-up to manufacturer's specifications), the cars without a catalyst, relative to those with a catalyst, produced higher rates of all emissions measured in these various projects, with the exception of ammonia. In the malfunction configurations, the cars without a catalyst produced the highest rates of hydrocarbons, particulates and aldehydes. All of the car groups, under some malfunction, produced essentially the same maximum rates of carbon monoxide, oxides of nitrogen and organic amines. Catalyst-equipped cars produced the highest rates of sulfates, organic sulfides, ammonia, and hydrogen sulfide. The cars with a three-way catalyst produced the highest rates of cyanides. It can be concluded that the catalyst significantly lowered the overall net emissions rate when the car was tuned-up to manufacturer's specifications. Under some malfunction conditions, however, the overall benefits from a catalyst were greatly reduced.

LIST OF REFERENCES

1. Urban, C. M., "Regulated and Unregulated Exhaust Emissions from Malfunctioning Non-Catalyst and Oxidation Catalyst Gasoline Automobiles," Final Report to Environmental Protection Agency under Contract No. 68-03-2499, January 1980.

2. Urban, C. M., "Regulated and Unregulated Exhaust Emissions from Malfunctioning Three-Way Catalyst Gasoline Automobiles," Final Report to Environmental Protection Agency under Contract No. 68-03-2588, January 1980.

3. Urban, C. M., "Regulated and Unregulated Exhaust Emissions from a Malfunctioning Three-Way Catalyst Gasoline Automobile," Final Report to Environmental Protection Agency under Contract No. 68-03-2692, January 1980.

4. Smith, L. R., "Characterization of Emissions from Motor Vehicles Designed for Low NO_x Emissions," Final Report to Environmental Protection Agency under Contract 68-02-2497, July 1980.

5. Dietzmann, H. E., et al, "Analytical Procedures for Characterizing Unregulated, Pollutant Emissions from Motor Vehicles," Report EPA 600/2-79-017, February 1979.

6. Code of Federal Regulations, Title 40, Chapter 1, Part 85, Subpart H, Sections applicable to 1979 Model Year Light-Duty Vehicles.

7. Congested Freeway Driving Schedule (Appendix VIII in the Recommended Practice for Measurement of Exhaust Sulfuric Acid Emission from Light-Duty Vehicles and Trucks, November 1976.

8. Highway Fuel Economy Driving Schedule (Federal Register, Vol. 41, No. 100, May 21, 1976, Appendix I).

9. U.S. HEW "Registry of Toxic Effects of Chemical Substances," 1976 and 1978 Editions.

10. Proceedings of the 1968 American Conference of Governmental Industrial Hygienists as reported in the Fifth Edition of the "Matheson Gas Data Book."

APPENDICES

A - GENERAL INFORMATION
B - SUMMARIES OF VEHICLE TESTING RESULTS
C - FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
D - COMPUTER PRINTOUTS OF THE REGULATED
    EMISSIONS TEST RESULTS
E - SHORT-TEST PROCEDURES RESULTS
F - AVERAGE VALUES FOR ALL CONFIGURATIONS

APPENDIX A

GENERAL INFORMATION

A-1 Measurement Procedure for Leaded Fuel Components
A-2 Short Test Procedures
A-3 Calculations for Unregulated Emissions

APPENDIX A-1.

THE MEASUREMENT OF LEADED FUEL COMPONENTS IN EXHAUST EMISSIONS

The measurement of leaded fuel components (tetraethyllead (TEL), tetramethyllead (TML), ethylene dibromide (EDB), and ethylene dichloride (EDC)) in exhaust is accomplished by direct bag analysis using a gas chromatograph equipped with an electron capture detector. A limited number of validation experiments were conducted to insure the accuracy and reliability of the procedure. Contacts were made with key individuals at EPA, Research Triangle Park to implement this analysis. The detection limits for this procedure are: 2 ppb TML; 5 ppb EDC; 5 ppb EDB; and 20 ppb TEL.

Analytical System

The analysis for leaded fuel components in exhaust is conducted using a gas chromatograph equipped with an electron capture detector. The system was designed for bag analysis and uses the CVS bag samples. The system employs two pneumatically-operated, electrically-controlled Seiscor valves, one in a gas sampling valve configuration and the other in a backflush configuration. Figure A-1 illustrates the flow schematic of the analytical system. A stripper column is included as a precautionary measure to prevent unwanted species from entering the analytical column.

The analytical column selected for this separation was a 20' x 1/8" Teflon column packed with 5% Carbowax 20M on 60/80 Mesh Gas Chrom Z. The gas chromatograph oven is maintained at 35°C during analysis. The system is in the inject configuration (Figure A-1) for 14 minutes followed by 14 minutes in the backflush configuration. The total analysis time is 25-30 minutes. A typical separation of the leaded components is presented in Figure A-2. The specific GC operating parameters for this separation are presented in Table A-1.

Control System

The control of the two Seiscor valves is accomplished by ATC timers and ASCO electric solenoid valves. The electrical schematic for the control of the Seiscor valves using these timers and electric solenoid valves is shown in Figure A-3. The flow schematic for the vacuum and pressure lines to the Seiscor valves is presented in Figure A-4.

Equipment

This analysis is performed using a gas chromatograph equipped with an electron capture detector. The gas chromatograph, recorder and data acquisition system are major components in the detection system. A control console was fabricated to house the mechanical hardware items that are necessary for the proper operation of the analysis system. The major items that are included in each of these systems are listed as follows:

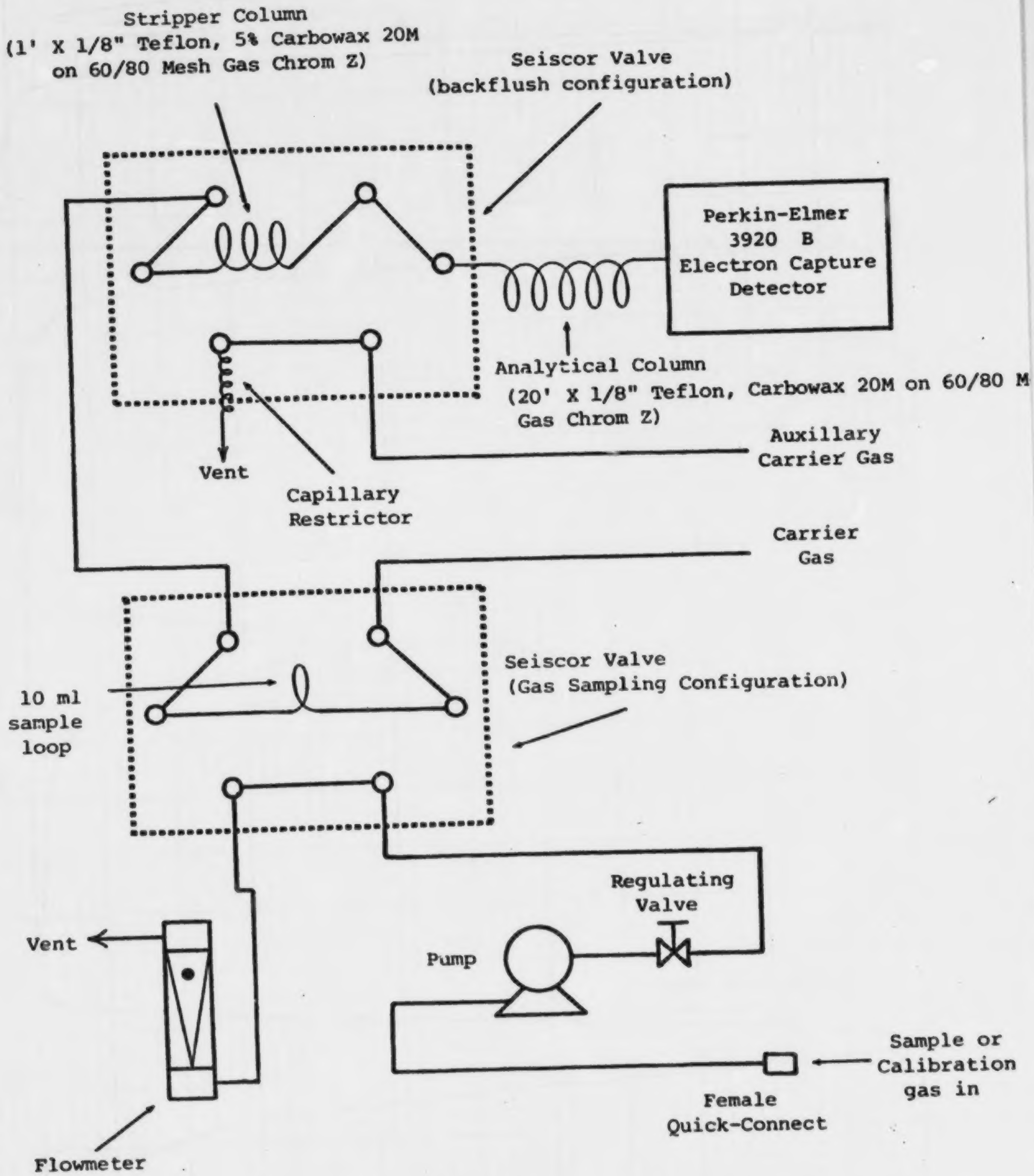


Figure A-1. Leaded fuel components analytical flow schematic (Inject sample or calibration gas into system)

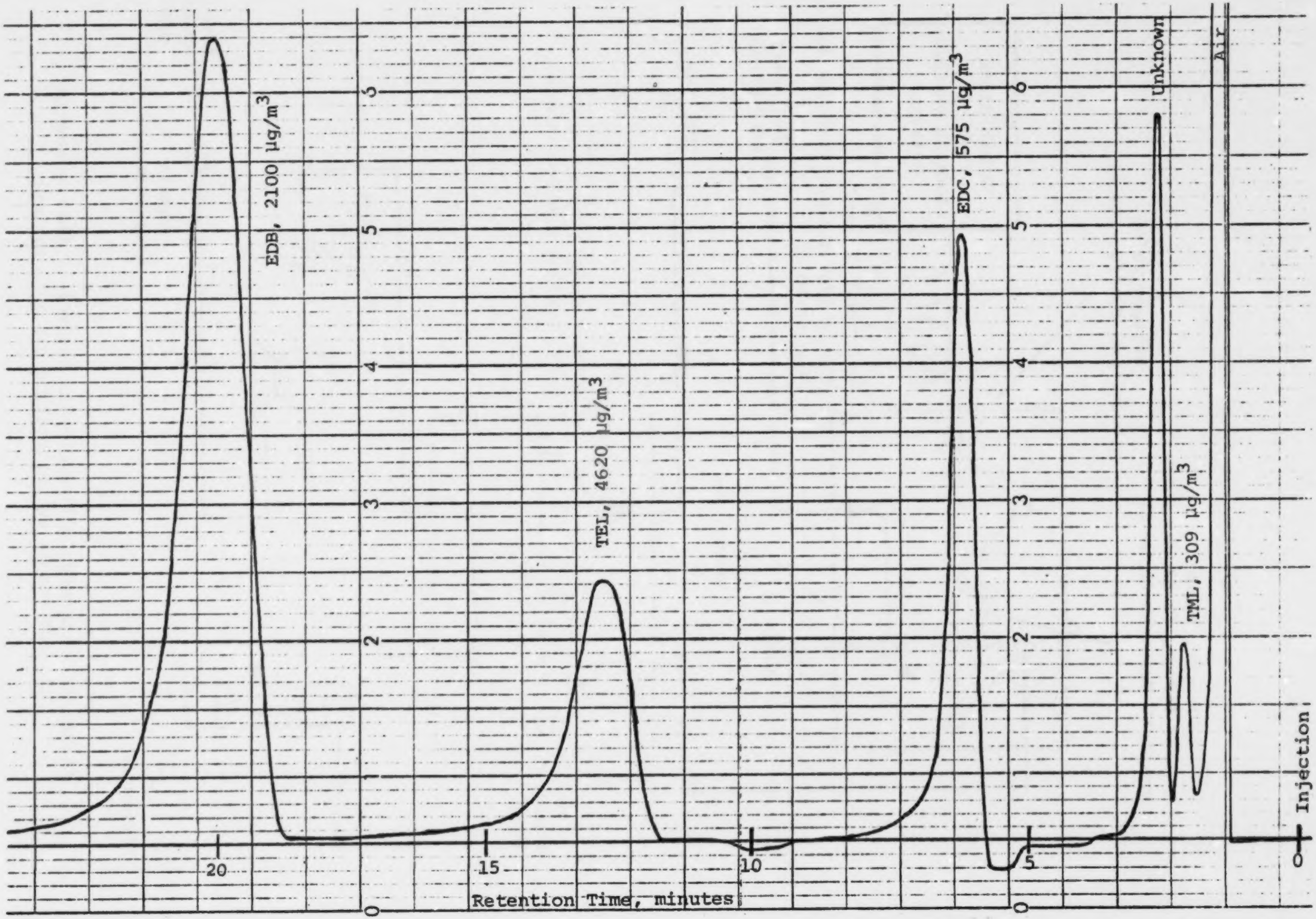


Figure A-2. Typical seperation of the leaded fuel components

TABLE A-1. LEADED FUEL COMPONENTS GAS CHROMATOGRAPH OPERATING PROCEDURES

Gas Chromatograph (oven):	Varian Aerograph Series 1400
Detector Type:	Electron Capture Detector (Perkin-Elmer)
Gas Sampling Valve:	Seiscor Model VIII (GSV Configuration)
Backflush Valve:	Seiscor Model VIII (BF Configuration)
Sample Loop Size:	10 mℓ
Column Temperature:	35°C
Detector Temperature:	325°C
Injection Temperature:	Ambient
Carrier Gas:	Argon 95%/methane 5%
Carrier Gas Flow:	35 cc/min
Column Dimensions:	20' x 1/8" Teflon
Column Material:	5% Carbowax 20M on 60/80 Mesh Gas Chrom Z
Stripper Column:	1' x 1/8" Teflon column packed with 5% Carbowax 20M on 60/80 Mesh Gas Chrom Z

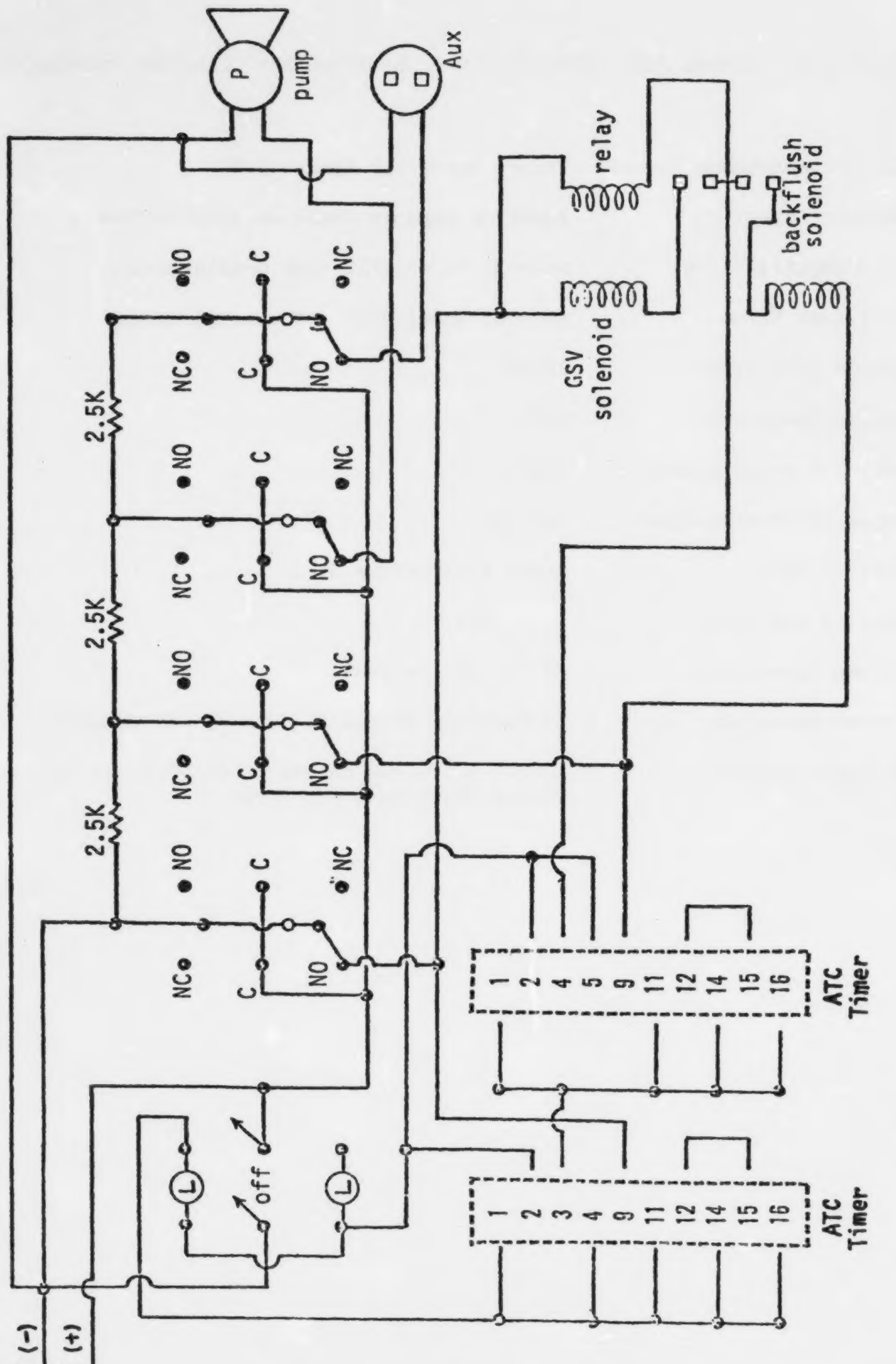
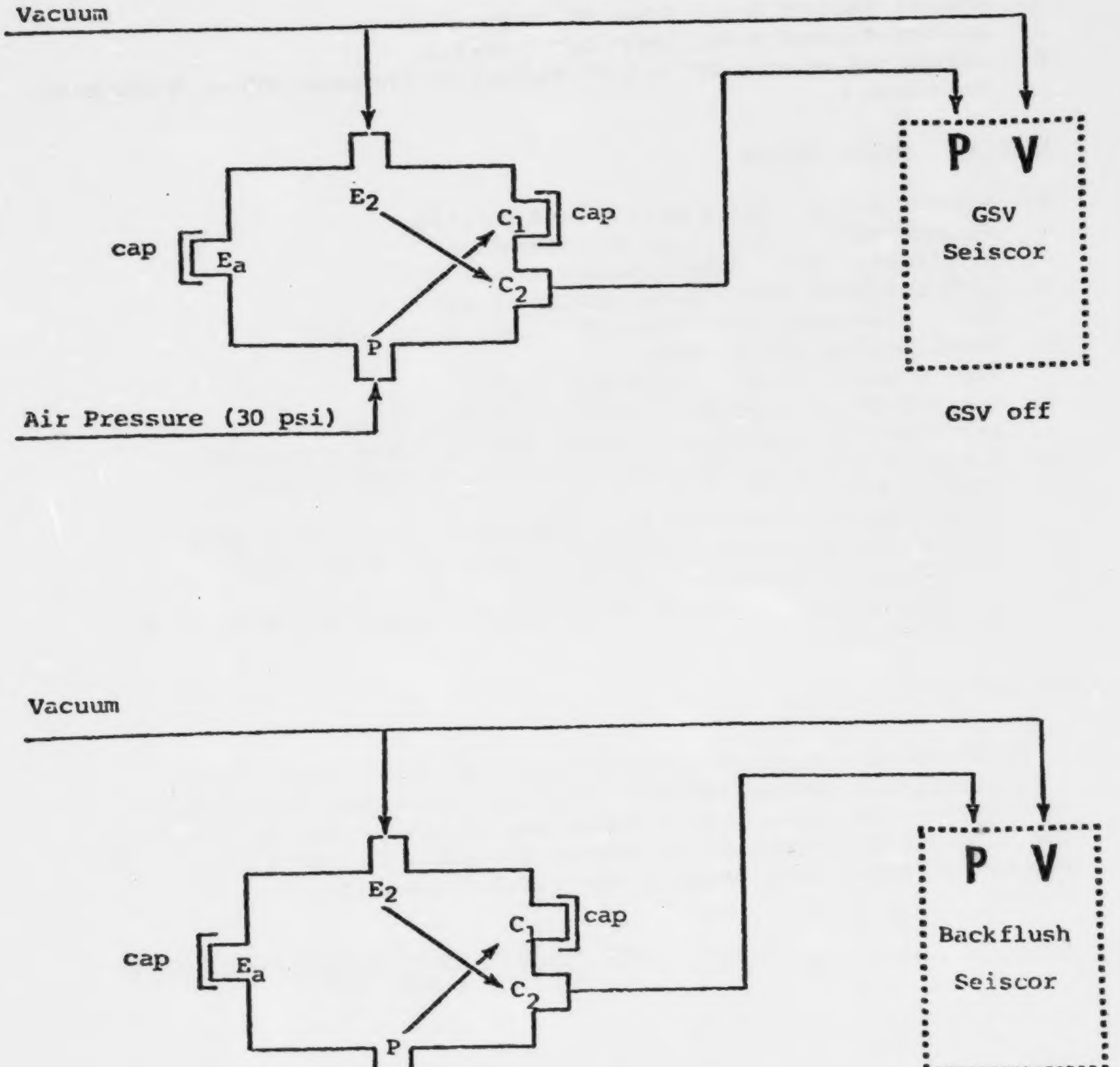


Figure A-3. Electrical schematic for leaded fuel components analysis system



Note: Schematic shows both valves de-energized.

Figure A-4. Flow schematic in electric solenoid valves

Gas Chromatograph

1. Varian Aerograph Series 1400 chromatograph
2. Perkin-Elmer electron capture detector
3. Soltec Model B-281 recorder
4. Hewlett-Packard Model 3354C GC computer system
5. Hewlett-Packard Model 1865A A/D Converter
6. Analytical column, 20' x 1/8" Teflon, 5% Carbowax 20M on 60/80 Mesh Gas Chrom Z.

Control Console System

1. Seiscor valve - gas sampling configuration
2. Seiscor valve - backflush configuration
3. ATC timers, Model 3254A346A10PX (2 ea)
4. ACSO solenoid valve, Model 834501 (2 ea)
5. Brooks flowmeter, R-2-15-A w/SS float, 0-150 scale
6. Metal Bellows MB-155 pump
7. Female quick-connect, stainless steel
8. Nupro Model 2M stainless steel regulating valve
9. Stainless steel tubing (0.01"ID) for capillary restrictor
10. Miscellaneous stainless steel, copper and Telfon tubing (1/8" and 1/16")
11. Miscellaneous stainless steel and brass unions, tees, etc.
12. Bud Classic II control console cabinet, 14" x 19" panel
13. Miscellaneous electrical on-off switches
14. Stripper column, 1' x 1/8" Teflon, 5% Carbowax 20M on 60/80 Mesh Gas Chrom Z.

Calculations

Standards are prepared daily by injecting known concentrations of tetramethyllead, tetraethyllead, ethylene dichloride, and ethylene dibromide in isooctane into a Tedlar bag containing 10ℓ of zero air. The leaded fuel components in exhaust are quantified by a direct comparison of sample peak areas to the standard peak areas.

$$\text{Conc. in Sample Bag, } \mu g/m^3 = \frac{\text{Conc. of Std, } \mu g/m^3 \times \text{Peak Area Sample}}{\text{Peak Area Std.}}$$

APPENDIX A-2.
I-M SHORT TEST DRIVER DATA SHEET
11-5830-005

Test No. ________ Date ____________ By ____________ Car Make ________________

NOTE: All tests are to be run with the hood open and the cooling fan on.

1. WARM-UP to normal operating condition:

If engine is cold - run UDDS ☐

If engine is warm - run 505 ☐

2. 50 MPH - Run 50 mph in Drive or 3rd gear (FTP Inertia and Hp Setting):

Gear Used - ________

Minute 1 - check and adjust load: HP _______ Inertia ______

Minute 2 - stabilize: Engine rpm ☐

Minute 3 - measure HC and CO

3. 4-MODE IDLE TEST - Idle 6 minutes and then measure HC and CO (Set minimum inertia during the 6 minutes).

(30 seconds per mode)

(a) Idle in neutral

(b) 2500 RPM in neutral

(c) Idle in neutral

(d) Idle in Drive (or with clutch in)

	RPM
(a)	
(b)	
(c)	
(d)	

4. 2-MODE TEST - Run 30 MPH (3 minutes total) and set dynamometer at 9.0 actual HP with minimum inertia - Idle 6 minutes and then measure HC & CO (30 seconds per mode)

(a) 30 mph (Drive or 3rd gear): ☐

(b) Idle in Neutral: RPM ☐

5. PROPANE ENRICHMENT* - Make a preliminary check. Adjust propane flow rate until the engine speed peaks out (and starts to decrease) at Idle.

Run 30 mph for two minutes

Idle in Neutral w/o propane for two minutes

Record RPM in each of the following conditions (each mode should take about 30 seconds):

a. PCV system in place w/o propane

b. PCV system in place with propane

c. PCV valve removed from grommet w/o propane

d. PCV valve removed from grommet with propane

e. PCV fresh air line opened w/o propane

f. PCV fresh air line opened with propane

	Max. RPM	
	Neutral	Drive
(a)		
(b)		
(c)		
(d)		
(e)		
(f)		

NOTE: Repeat the two minutes at 30 mph and at idle, and "a" through "f" in Drive, in cars with an automatic transmission. Brake to be on.

*Propane into air horn

APPENDIX A- 3. CALCULATIONS FOR UNREGULATED EMISSIONS

This appendices documents the calculational methods used for the unregulated emissions. All values not defined (i.e., CVS FLOW, VOL, etc.) are obtained from the computer printouts for the regulated emissions. Example printout is included as Table 1.

A. Individual Hydrocarbons, Nickel Carbonyl, N_2O and H_2S

1. For FTP Evaluations only, convert 2-Bag UDDS to Equivalent 1-Bag UDDS

$$\text{PPM } 12 = \frac{\text{PPM}_1 \times \text{CVS FLOW}_1 + \text{PPM}_2 \times \text{CVS FLOW}_2}{\text{CVS FLOW}_1 + \text{CVS FLOW}_2}$$

$$\text{PPM } 34 = \frac{\text{PPM}_3 \times \text{CVS FLOW}_3 + \text{PPM}_4 \times \text{CVS FLOW}_4}{\text{CVS FLOW}_3 + \text{PPM FLOW}_4}$$

2. Convert PPM to $\mu g/m^3$:

$$\mu g/m^3 = 35.32 \times \text{DENSITY} \times \text{PPM}$$

Density, g/ft^3			
Methane CH_4	- 18.86	Propane C_3H_8	- 17.29
Ethylene C_2H_4	- 16.50	Propylene C_3H_6	- 16.50
Ethane C_2H_6	- 17.68	Benzene C_6H_6	- 15.33
Acetylene C_2H_2	- 15.33	Toluene C_7H_8	- 15.49
H_2S	- 40.12	N_2O	- 51.82
NH_3	- 20.05	$Ni(CO)_4$	-200.99

B. Calculation of mg/km

$$\text{mg/km} = \Big((\text{EXH} \times \text{SCF} - \text{BG} \times \text{DFC}) \times \text{VOL} \div \text{KM}\Big) \div 1000$$

Calculations were performed using a Hewlett Packard HP-65 Programmable Calculator

Dry (DFC) and (SFC) was used for all unregulated emissions except: IHC, N_2O and $Ni\ (CO)_4$

DFC and SCF are obtained from the computer print-out for regulated emissions. (See Tables 1 and 2.)

C. Metals and Other Elements

$$\text{COMPONENT WEIGHT ON FILTER} = \mu g/cm^2 \times \text{EFF. FILTER AREA}$$

$$\text{EFF. FILTER AREA} = 14.3\ cm^2$$

$$\text{COMPONENT } \mu g/m^3 = \text{C.W.O.F.} \div \text{TOTAL WT.} \times (\mu g/m^3 \text{ for Total Wt.})$$

APPENDIX A- 3 (Cont'd). CALCULATIONS FOR UNREGULATED EMISSIONS

D. Calculation of Average Temperature and Oxygen

$$\text{Average} = \frac{\text{INTEGRATOR COUNTS}}{6.994 \times \text{SECONDS}} \times \text{FULL SCALE VALUE}$$

$$= \% \text{ for Oxygen}$$

$$= \text{MV for Catalyst Temperature}$$

E. Calculation for 4-FTP

$$\text{Composite 4-FTP} = 0.43 \times (\text{Value for 1\&2}) + 0.57 \times (\text{Value for 3\&4})$$

Appendix A-3 (Cont'd). CALCULATIONS FOR UNREGULATED EMISSIONS
TABLE 1. COMPUTER PRINTOUT NOMENCLATURE FOR FOUR-BAG FTP

```
                                      PVM -      FTP  VEHICLE EMISSIONS RESULTS - MALFUNCTION CONDITION
                                                      PROJECT
TEST NO.               RUN
VEHICLE MODEL                                        VEHICLE NO.                             TEST WEIGHT       KG(        LBS)
ENGINE      L(     CID)                              DATE                                    ACTUAL ROAD LOAD       KW(       HP)
TRANSMISSION A3                                      BAG CART NO.                            GASOLINE  EM-
GVW        KG(        LBS)                           DYNO NO.                                ODOMETER          KM(        MILES)
                                                     CVS NO.

BAROMETER          MM HG(       IN HG)               DRY BULB TEMP.      DEG C(      DEG F)
RELATIVE HUMIDITY     PCT                            ABS. HUMIDITY      GM/KG                NOX HUMIDITY CORRECTION FACTOR
BAG RESULTS
   BAG NUMBER                                           1                    2                   3                    4
   DESCRIPTION                                   COLD TRANSIENT         STABILIZED         HOT TRANSIENT          STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)
   BLOWER INLET P MM. H2O(IN. H2O)
   BLOWER INLET TEMP. DEG. C(DEG. F)
   BLOWER REVOLUTIONS
   CVS FLOW STD. CU. METRES(SCF)
   HC  SAMPLE METER/RANGE/PPM
   HC  BCKGRD METER/RANGE/PPM
   CO  SAMPLE METER/RANGE/PPM
   CO  BCKGRD METER/RANGE/PPM
   CO2 SAMPLE METER/RANGE/PCT
   CO2 BCKGRD METER/RANGE/PCT
   NOX SAMPLE METER/RANGE/PPM
   NOX BCKGRD METER/RANGE/PPM
   DILUTION FACTOR

   HC  CONCENTRATION PPM
   CO  CONCENTRATION PPM
   CO2 CONCENTRATION PCT
   NOX CONCENTRATION PPM
   HC  MASS GRAMS
   CO  MASS GRAMS
   CO2 MASS GRAMS
   NOX MASS GRAMS

   HC  GRAMS/KM
   CO  GRAMS/KM
   CO2 GRAMS/KM
   NOX GRAMS/KM
   FUEL CONSUMPTION BY CB L/100KM

   RUN TIME               SECONDS
   AVG. EXH. OXYGEN       PERCENT
   CATALYST AVG. TEMP.    DEG. C
   CATALYST MAX. TEMP.    DEG. C
   MEASURED DISTANCE      KM
        DFC, WET (DRY)
        SCF, WET (DRY)
        VOL (SCM)
        KM  (MEASURED)

COMPOSITE RESULTS
   TEST NUMBER                                                                                                      3-BAG       (4-BAG)
   BAROMETER     MM HG          TOTAL FUEL SULFUR    MG/KM          CARBON DIOXIDE        G/KM                               (     )
   HUMIDITY      G/KG           AVG. EXH. OXYGEN     PCT            FUEL CONSUMPTION      L/100KM                            (     )
   TEMPERATURE   DEG C          CATALYST AVG. TEMP.  DEG C          HYDROCARBONS (THC)    G/KM                               (     )
                                CATALYST MAX. TEMP.  DEG C          CARBON MONOXIDE       G/KM                               (     )
                                                                    OXIDES OF NITROGEN    G/KM                               (     )
```

APPENDIX A- 3(Cont'd). CALCULATION FOR UNREGULATED EMISSIONS
TABLE 2. DEFINITION OF COMPUTER PRINTOUT NOMENCLATURE

FOR FOUR-BAG AND SINGLE-BAG

REGULATED EMISSIONS

The following are primarily exerpts taken from the computer program:

AVG. EXH. OXYGEN: Direct printout of an input

CATALYST AVG. AND MAX. TEMPS.: Input converted to °C and printed-out

```
C    DFC = DILUTION FACTOR CORRECTION  DFC = FOR WET SAMPLES  DFCD = FOR DRY

     DF(J)=13.4/(  YC2(2,J) +(( YH(2,J) + CC(2,J))/10000.))
     DFC(J) = 1 - 1/DF(J)

C    CALCULATE DFC, VOL. KM FOR BAGS 1+2 AND 3+4
C    DF = TOTAL CVS FLOW / EXHAUST FLOW = AIR + EXH / EXH
C    DFC = 1 - 1/DF = 1 - EXH/(AIR+EXH) = AIR/(AIR+EXH)
     DFC12 =(DFC(1)*VMIX(1) + DFC(2)*VMIX(2)) / (VMIX(1) + VMIX(2))
     DFC34 = (DFC(3)*VMIX(3) + DFC(4)*VMIX(4)) / (VMIX(3) + VMIX(4))
     IF(RH.LT.20) RH = 20
     DFCD12 = DFC12 * (1.0 - 0.000323*(RH - 20))
     DFCD34 = DFC34 * (1.0 - 0.000323*(RH - 20))

C    SCF = SAMPLE CORRECTION FACTOR FOR WATER REMOVAL   SCF = FOR WET   SCFD=DRY
     SCF12 = 1.000
     SCF34 = 1.000
     SCFD12 = (SCFD(1)*VMIX(1)+SCFD(2)+VMIX(2)) / (VMIX(1) + VMIX(2))
     SCFD34 = (SCFD(3)*VMIX(3)+SCFD(4)*VMIX(4)) / (VMIX(3) + VMIX(4))
```

TOTAL FUEL SULFUR:

```
C    TFS = TOTAL FUEL SULFUR IN MG/KM
C    TFS = L/100KM * PCT  * G/ML * 1000ML/L * 0.01G/GPCT * 1000MG/G

     TFS = CBFM   * FSWPCT * FPPG * 100.

C    CALCULATE 4-BAG EMISSIONS AND FUEL CONSUMPTION
C    4-BAG = 0.43*(BAG1+BAG2)/(MILES1+MILES2)+0.57*(BAG3+BAG4)/(MILES3+MILES4)

     DISTA=MILES(1) + MILES(2)
     DISTB=MILES(2) + MILES(3)
     DISTC=MILES(3) + MILES(4)

     HCWM4 = 0.43*((HCM(1)+HCM(2)) / DISTA) + 0.57*((HCM(3)+HCM(4)) / DISTC)
     COWM4 = 0.43*((COM(1)+COM(2)) / DISTA) + 0.57*((COM(3)+COM(4)) / DISTC)
     CO2WM4= 0.43*((CO2M(1)+CO2M(2))/DISTA) + 0.57*((CO2M(3)+CO2M(4)) / DISTC)
     NOXWM4= 0.43*((NOXM(1)+NOXM(2))/DISTA) + 0.57*((NOXM(3)+NOXM(4)) / DISTC)
     CBFE4 = 2421. / (.866*HCWM4 + .429*COWM4 + .273*CO2WM4)
```

APPENDIX B

SUMMARIES OF VEHICLE TEST RESULTS

TABLE B-1. CAR 711 - RICH BEST IDLE
1970 OLDSMOBILE DELTA 88

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	711-11	711-12	711-13	711-21	711-22	711-23	711-31	711-32	711-33
Barometer, mm hg	743.7	743.2	742.7	744.0	743.5	743.5	746.0	745.5	745.2
Humidity, g/kg	10.1	9.9	9.9	6.7	5.8	5.6	6.9	6.8	12.1
Temperature, °C	24.4	25.0	25.0	26.1	28.3	28.9	25.6	24.4	26.7
Total Fuel Sulfur, mg/km	33.70	23.36	20.43	33.72	23.46	20.30	33.88	23.31	20.07
Avg. Exh. Oxygen, %	1.03	1.15	0.94	--	0.65	0.77	0.50	0.60	0.68
Carbon Dioxide, g/km	449.3	322.3	281.0	418.4	313.4	277.4	416.2	308.4	272.6
Fuel Cons., ℓ/100 km	20.70	14.35	12.55	20.71	14.41	12.47	20.81	14.32	12.33
Regulated Emissions									
Hydrocarbons (THC), g/km	1.61	0.96	1.01	1.91	1.02	0.91	1.99	1.09	0.97
Carbon Monoxide, g/km	19.46	6.89	6.30	38.67	13.45	7.54	41.34	15.09	8.31
Oxides of Nitrogen, g/km	2.26	3.01	3.27	2.18	2.99	3.22	2.17	2.95	3.64
Particulates									
Total Particulates	111.71	71.18	73.27	92.21	65.41	53.69	85.02	57.79	53.76
Sulfate	0.48	0.49	0.32	0.55	0.43	0.24	0.71	0.41	0.09
Sulfate as % of TFS, %	0.47	0.70	0.52	0.54	0.61	0.39	0.70	0.59	0.15
Compound Group Totals									
Aldehydes & Ketones	43.4	31.3	24.6	45.7	31.6	30.9	43.2	28.9	34.3
Individual Hydrocarbons	868.3	512.1	439.4	948.9	549.8	480.7	991.2	602.0	513.6
Organic Sulfides	0.09	0.02	0.00	0.03	0.00	0.00	0.03	0.00	0.00
Organic Amines	0.04	0.11	0.08	0.08	0.07	0.00	0.28	0.06	0.10
Other Compounds									
Ammonia	2.73	1.77	2.99	2.11	4.67	2.83	3.85	4.89	3.62
Cyanide & Cyanogen	3.36	1.42	6.46	6.29	2.32	9.16	4.85	1.57	7.10
Hydrogen Sulfide	0.15	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	--	--	--	--	--	--	--	--	--
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-1. CAR 711 - RICH BEST IDLE (Cont'd)
1970 OLDSMOBILE DELTA 88

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	711-11	711-12	711-13	711-21	711-22	711-23	711-31	711-32	711-33
Aldehydes and Ketones									
Formaldehyde	36.55	27.69	21.20	30.15	27.25	27.14	32.25	25.86	29.83
Acetaldehyde	5.72	3.31	3.43	5.60	4.24	3.80	6.61	2.75	4.32
Acetone	0.64	0.00	0.00	9.74	0.00	0.00	3.86	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.53	0.28	0.00	0.25	0.11	0.00	0.47	0.29	0.15
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	43.4	31.3	24.6	45.7	31.6	30.9	43.2	28.9	34.3
Total as % of THC, %	2.7	3.3	2.4	2.4	3.1	3.4	2.2	2.7	3.5
Individual Hydrocarbons									
Methane	106.91	45.89	36.14	157.82	69.39	51.78	166.05	80.70	59.28
Ethylene	168.43	137.13	109.69	217.19	154.65	142.96	229.92	165.78	150.28
Ethane	16.05	13.00	11.19	20.12	14.51	13.87	20.93	15.74	15.28
Acetylene	128.31	65.47	55.88	166.93	89.96	75.54	185.04	101.35	83.18
Propane	2.23	1.19	0.78	2.05	1.07	0.99	14.29	9.04	4.36
Propylene	68.20	55.14	44.71	82.57	58.92	57.07	87.99	64.43	61.91
Benzene	59.94	44.65	35.25	79.49	50.22	39.98	82.62	53.38	42.44
Toluene	318.25	149.66	145.77	222.69	111.06	98.55	204.36	111.59	96.86
Total Individual HC	868.3	512.1	439.4	948.9	549.8	480.7	991.2	602.0	513.6
Total as % of THC, %	53.9	53.3	43.5	49.7	53.9	52.8	49.8	55.2	52.9
Organic Sulfides									
Carbonyl Sulfide	0.07	0.01	0.00	0.02	0.00	0.00	0.01	0.00	0.00
Methyl Sulfide	0.02	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.04	0.05	0.07	0.06	0.07	0.01	0.04	0.01	0.01
Monoethylamine	0.00	0.02	0.01	0.02	0.00	0.00	0.21	0.05	0.09
Trimethylamine	0.00	0.04	0.00	0.00	0.00	0.00	0.03	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-1. CAR 711 - RICH BEST IDLE (Cont'd.)

1970 OLDSMOBILE DELTA 88

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		711-11	711-12	711-13	711-21	711-22	711-23	711-31	711-32	711-33
Other Elements										
Chromium	Cr									
Lead	Pb	17.27	19.70	16.87	16.42	18.40	16.49	17.81	16.25	16.17
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	10.21	14.98	12.96	9.67	14.46	12.69	10.07	13.12	12.91
Phosphorus	P	0.08	0.07	0.06	0.06	0.06	0.06	0.06	0.06	0.07
Silicon	Si				0.03					
Cadmium	Cd	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Aluminum	Al	0.03	0.11	0.06	0.02	0.06	0.03	0.01	0.04	0.05
Sulfur	S	0.11	0.05	0.03		0.03	0.02	0.07	0.02	0.02
Sodium	Na	0.05	0.08	0.06	0.03	0.06	0.05	0.05	0.06	0.06
Fluorine	F									
Magnesium	Mg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Potassium	K									
Chlorine	Cl	6.06	4.82	4.25	6.28	4.72	4.54	6.59	4.04	4.03
Platinum	Pt									
Zinc	Zn		0.03					0.02		
Copper	Cu	0.02	0.03					0.02		
Nickel	Ni									
Iron	Fe	0.52	0.31	0.07	0.26	0.20	0.03	0.17	0.05	
Vanadium	V							0.01	0.01	
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.05	0.01		0.08	0.02	0.01	0.01	0.01	

TABLE B-2. CAR 712 - 12 PERCENT MISFIRE
1970 OLDSMOBILE DELTA 88

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number,	PVM-ST	712-11	712-12	712-13	712-21	712-22	712-23	712-41	712-42	712-43
Barometer,	mm hg	753.6	753.4	753.1	749.8	751.3	750.3	757.4	757.2	756.9
Humidity,	g/kg	4.8	4.5	4.2	4.8	5.2	5.0	4.3	3.6	3.8
Temperature,	°C	23.3	23.9	26.1	26.1	26.7	25.6	24.4	26.1	25.6
Total Fuel Sulfur,	mg/km	33.70	23.00	20.27	34.84	24.39	21.90	34.92	24.32	21.77
Avg. Exh. Oxygen,	%	1.65	1.73	1.28	4.57	4.46	3.82	4.02	3.90	3.48
Carbon Dioxide,	g/km	456.2	320.8	281.9	427.0	309.0	277.9	430.8	308.7	276.5
Fuel Cons.,	ℓ/100 km	20.70	14.13	12.45	21.40	14.98	13.45	21.45	14.94	13.37
Regulated Emissions										
Hydrocarbons (THC),	g/km	1.25	0.86	0.89	15.36	10.60	9.60	15.08	10.33	9.32
Carbon Monoxide,	g/km	15.71	4.83	4.41	16.36	5.28	4.27	15.23	5.39	4.51
Oxides of Nitrogen,	g/km	2.20	2.95	3.09	2.64	3.62	3.71	2.85	3.53	3.91
Particulates										
Total Particulates		89.70	64.98	64.78	132.59	66.37	69.78	115.13	74.03	75.65
Sulfate		0.87	0.37	0.46	0.26	0.31	0.31	0.76	0.83	0.60
Sulfate as % of TFS,	%	0.86	0.53	0.76	0.25	0.42	0.47	0.73	1.14	0.92
Compound Group Totals										
Aldehydes & Ketones		31.2	33.0	29.3	248.3	210.8	143.3	260.6	121.8	135.6
Individual Hydrocarbons		529.3	375.2	303.9	3076.6	2351.5	1970.3	3210.6	2491.3	2093.8
Organic Sulfides		0.07	0.03	0.04	0.05	0.00	0.01	0.03	0.00	0.00
Organic Amines		0.11	0.09	0.11	0.37	0.39	0.07	0.43	0.30	0.22
Other Compounds										
Ammonia		4.91	2.88	7.84	1.81	1.61	2.52	1.95	1.92	2.54
Cyanide & Cyanogen		3.53	2.18	6.92	1.22	0.28	0.87	1.12	0.25	0.80
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride		--	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead		--	--	--	--	--	--	--	--	--
Ethylene Dibromide		0.00	0.00	0.00	4.48	2.15	3.50	2.88	2.84	1.47

TABLE B-2. CAR 712 - 12 PERCENT MISFIRE (Cont'd)
1970 OLDSMOBILE DELTA 88

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	712-11	712-12	712-13	712-21	712-22	712-23	712-41	712-42	712-43
Aldehydes and Ketones									
Formaldehyde	27.18	25.85	24.46	200.92	166.50	120.50	211.55	104.33	124.44
Acetaldehyde	3.20	6.45	4.53	30.07	26.04	16.78	36.91	14.51	9.95
Acetone	0.78	0.69	0.30	11.03	11.37	4.96	5.92	1.04	0.49
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.00	0.00	0.00	5.01	3.81	1.06	2.41	0.59	0.71
Hexanaldehyde	0.00	0.00	0.00	1.30	3.07	0.00	3.78	1.34	0.00
Aldehydes and Ketones	31.2	33.0	29.3	248.3	210.8	143.3	260.6	121.8	135.6
Total as % of THC, %	2.5	3.8	3.3	1.6	2.0	1.5	1.7	1.2	1.5
Individual Hydrocarbons									
Methane	59.12	29.83	26.18	97.09	49.85	46.33	100.48	56.02	53.23
Ethylene	148.67	120.10	93.35	335.90	291.11	266.43	374.34	327.51	306.96
Ethane	12.34	9.99	8.65	29.41	23.66	22.92	33.63	26.40	25.70
Acetylene	75.18	48.90	42.06	110.62	64.10	65.68	116.95	74.30	78.20
Propane	0.63	1.09	0.57	2.95	1.81	1.74	2.77	1.93	1.77
Propylene	62.79	49.85	39.27	225.76	207.06	188.00	243.45	220.80	206.08
Benzene	43.70	32.59	25.91	212.10	210.33	93.22	183.54	138.92	117.34
Toluene	126.82	82.81	67.93	2062.78	1503.57	1285.99	2155.45	1645.46	1304.47
Total Individual HC	529.3	375.2	303.9	3076.6	2351.5	1970.3	3210.6	2491.3	2093.8
Total as % of THC, %	42.3	43.6	34.1	20.0	22.2	20.5	21.3	24.1	22.5
Organic Sulfides									
Carbonyl Sulfide	0.02	0.01	0.01	0.03	0.00	0.01	0.01	0.00	0.00
Methyl Sulfide	0.04	0.02	0.03	0.02	0.00	0.00	0.02	0.00	0.00
Ethyl Sulfide	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.11	0.08	0.11	0.37	0.39	0.07	0.36	0.30	0.21
Monoethylamine	0.00	0.01	0.00	0.00	0.00	0.00	0.07	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-2. CAR 712 - 12 PERCENT MISFIRE (Cont'd).
1970 OLDSMOBILE DELTA 88

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		712-11	712-12	712-13	712-21	712-22	712-23	712-41	712-42	712-43
Other Elements										
Chromium	Cr									
Lead	Pb	22.06	19.01	12.31	29.81	20.14	18.22	36.38	29.89	24.16
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	15.14	19.84	13.11	12.98	11.03	9.51	18.29	18.53	14.57
Phosphorus	P	0.10	0.08	0.06	0.10	0.09	0.07	0.11	0.11	0.11
Silicon	Si	0.02			0.04					
Cadmium	Cd		0.02		0.01	0.01	0.01	0.02	0.02	0.02
Aluminum	Al	0.10	0.17	0.03	0.14	0.03	0.01	0.10	0.12	0.02
Sulfur	S	0.25	0.08	0.03	0.59	0.32	0.25	0.55	0.34	0.25
Sodium	Na	0.07	0.08	0.05	0.08	0.05	0.05	0.09	0.08	0.06
Fluorine	F									
Magnesium	Mg	0.02	0.02	0.01	0.03	0.01	0.01	0.03	0.02	0.02
Potassium	K									
Chlorine	Cl	9.10	7.19	5.10	5.21	3.69	3.73	6.25	4.80	4.04
Platinum	Pt									
Zinc	Zn	0.05	0.03		0.06			0.03		
Copper	Cu		0.03			0.02		0.02	0.02	
Nickel	Ni				0.02					
Iron	Fe	3.88	0.85	0.16	5.79	0.89	0.17	3.22	0.88	0.26
Vanadium	V	0.01					0.01			
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.05	0.04		0.06	0.03	0.05	0.05	0.03	0.02

TABLE B-3. CAR 712 - 12 PERCENT MISFIRE PLUS UNKNOWN MALFUNCTION
1970 OLDSMOBILE DELTA 88

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number,	PVM-ST				712-31	712-32	712-33			
Barometer,	mm hg				748.5	748.5	747.8			
Humidity,	g/kg				5.3	5.7	5.8			
Temperature,	°C				25.0	25.6	26.7			
Total Fuel Sulfur,	mg/km				38.45	27.58	24.49			
Avg. Exh. Oxygen,	%				6.98	6.84	6.03			
Carbon Dioxide,	g/km				414.3	306.6	273.1			
Fuel Cons.,	ℓ/100 km				23.62	16.94	15.04			
Regulated Emissions										
Hydrocarbons (THC),	g/km				34.52	24.89	22.49			
Carbon Monoxide,	g/km				18.83	7.12	5.00			
Oxides of Nitrogen,	g/km				2.97	3.54	4.06			
Particulates										
Total Particulates					110.77	70.20	64.64			
Sulfate					0.97	1.06	0.99			
Sulfate as % of TFS,	%				0.84	1.28	1.35			
Compound Group Totals										
Aldehydes & Ketones					295.6	315.5	258.4			
Individual Hydrocarbons					7292.3	5643.2	5156.4			
Organic Sulfides					0.04	0.01	0.01			
Organic Amines					0.34	0.17	0.15			
Other Compounds										
Ammonia					4.78	3.90	9.05			
Cyanide & Cyanogen					1.53	0.44	1.60			
Hydrogen Sulfide					0.23	0.00	0.00			
Tetramethyllead					0.00	0.00	0.00			
Ethylene Dichloride					0.00	0.00	0.00			
Tetraethyllead					--	--	--			
Ethylene Dibromide					10.45	5.76	5.84			

TABLE B-3 . CAR 712 - 12 PERCENT MISFIRE PLUS UNKNOWN MALFUNCTION (Cont'd).
1970 OLDSMOBILE DELTA 88

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST				712-31	712-32	712-33			
Aldehydes and Ketones									
Formaldehyde				205.25	235.95	210.25			
Acetaldehyde				17.88	43.05	29.31			
Acetone				4.69	20.54	9.88			
Isobutyraldehyde				--	--	--			
Methyl Ethyl Ketone				2.29	8.56	4.71			
Hexanaldehyde				65.49	7.41	4.20			
Aldehydes and Ketones				295.6	315.5	258.4			
Total as % of THC, %				0.9	1.3	1.1			
Individual Hydrocarbons									
Methane				121.41	66.92	57.26			
Ethylene				440.46	415.96	367.72			
Ethane				40.90	35.73	31.72			
Acetylene				124.22	72.04	69.66			
Propane				3.88	2.50	2.09			
Propylene				305.06	308.83	273.59			
Benzene				371.95	422.98	270.07			
Toluene				5884.43	4318.26	4084.26			
Total Individual HC				7292.3	5643.2	5156.4			
Total as % of THC, %				21.1	22.7	22.9			
Organic Sulfides									
Carbonyl Sulfide				0.01	0.01	0.01			
Methyl Sulfide				0.03	0.00	0.00			
Ethyl Sulfide				0.00	0.00	0.00			
Methyl Disulfide				0.00	0.00	0.00			
Organic Amines									
Monomethylamine				0.34	0.17	0.15			
Monoethylamine				0.00	0.00	0.00			
Trimethylamine				0.00	0.00	0.00			
Diethylamine				0.00	0.00	0.00			
Triethylamine				0.00	0.00	0.00			

TABLE B-3 . 12 PERCENT MISFIRE PLUS UNKNOWN MALFUNCTION (Cont'd).
1970 OLDSMOBILE DELTA 88

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		-	-	-	712-31	712-32	712-33	-	-	-
Other Elements										
Chromium	Cr									
Lead	Pb				48.55	28.52	24.25			
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br				18.49	11.60	9.60			
Phosphorus	P				0.12	0.09	0.07			
Silicon	Si				0.03					
Cadmium	Cd				0.03	0.02	0.01			
Aluminum	Al				0.14	0.06				
Sulfur	S				0.97	0.60	0.39			
Sodium	Na				0.13	0.06	0.05			
Fluorine	F									
Magnesium	Mg				0.03	0.02	0.01			
Potassium	K									
Chlorine	Cl				7.63	4.67	4.52			
Platinum	Pt									
Zinc	Zn				0.07	0.04				
Copper	Cu				0.03					
Nickel	Ni									
Iron	Fe				9.88	5.68	0.86			
Vanadium	V									
Titanium	Ti									
Barium	Ba									
Calcium	Ca				0.05	0.03				

TABLE B-4. CAR 721 - RICH BEST IDLE
1970 DODGE CHALLENGER

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	721-11	721-12	721-13	721-21	721-22	721-23	721-31	721-32	721-33
Barometer, mm hg	744.2	744.2	744.0	753.6	752.3	751.6	743.7	743.0	741.9
Humidity, g/kg	9.7	8.8	9.9	3.5	4.1	3.9	10.1	9.4	8.3
Temperature, °C	23.9	24.4	25.0	27.8	25.0	25.6	26.1	26.1	25.6
Total Fuel Sulfur, mg/km	20.27	15.08	14.00	20.95	15.65	14.13	20.95	15.65	14.41
Avg. Exh. Oxygen, %	--	1.21	1.44	--	1.13	1.48	1.44	0.94	1.29
Carbon Dioxide, g/km	255.7	205.2	193.8	239.8	203.2	195.1	234.8	201.5	197.5
Fuel Cons., ℓ/100 km	12.45	9.26	8.60	12.87	9.61	8.68	12.87	9.61	8.85
Regulated Emissions									
Hydrocarbons (THC), g/km	1.71	0.85	0.67	2.29	1.25	0.74	2.39	1.23	0.76
Carbon Monoxide, g/km	19.38	5.79	3.47	34.60	11.54	3.84	37.68	12.64	4.70
Oxides of Nitrogen, g/km	1.83	2.56	2.79	1.83	2.54	2.64	1.79	2.66	2.88
Particulates									
Total Particulates	68.39	48.43	51.56	--	--	38.41	93.71	50.34	52.31
Sulfate	0.61	0.18	0.17	1.30	0.20	0.36	0.81	0.85	0.79
Sulfate as % of TFS, %	1.00	0.40	0.40	2.07	0.43	0.85	1.29	1.81	1.83
Compound Group Totals									
Aldehydes & Ketones	7.3	8.9	7.1	11.5	13.6	10.5	10.7	19.1	9.4
Individual Hydrocarbons	764.2	378.0	222.1	1066.5	576.3	331.2	1090.5	563.8	352.1
Organic Sulfides	0.00	0.00	0.00	--	0.01	0.00	0.00	0.00	0.00
Organic Amines	0.01	0.02	0.02	0.13	0.09	0.01	0.00	0.00	0.00
Other Compounds									
Ammonia	1.30	1.08	1.36	4.22	8.84	2.21	4.53	2.12	3.58
Cyanide & Cyanogen	4.21	2.34	5.87	--	--	--	9.92	5.33	8.63
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-4. CAR 721 - RICH BEST IDLE (Cont'd).
1970 DODGE CHALLENGER

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	721-11	721-12	721-13	721-21	721-22	721-23	721-31	721-32	721-33
Aldehydes and Ketones									
Formaldehyde	7.27	8.67	6.26	10.38	12.02	10.07	8.33	14.98	9.40
Acetaldehyde	0.00	0.26	0.81	0.97	1.54	0.46	2.06	4.16	0.00
Acetone	0.00	0.00	0.00	0.12	0.00	0.00	0.26	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	7.3	8.9	7.1	11.5	13.6	10.5	10.7	19.1	9.4
Total as % of THC, %	0.4	1.0	1.1	0.5	1.1	1.4	0.4	1.6	1.2
Individual Hydrocarbons									
Methane	100.80	35.28	18.08	184.51	78.47	31.91	202.10	83.07	37.48
Ethylene	169.08	103.98	64.74	248.32	147.33	96.62	249.67	151.83	105.29
Ethane	13.66	9.69	5.64	22.47	13.88	8.69	23.37	15.43	10.41
Acetylene	181.27	77.84	40.07	178.62	94.34	51.46	198.86	98.20	57.87
Propane	0.30	0.15	0.17	2.21	1.08	0.83	2.33	1.36	0.81
Propylene	68.90	42.01	27.36	94.40	57.05	40.21	94.26	58.49	42.98
Benzene	51.70	26.97	17.12	84.82	54.71	27.00	81.79	39.45	25.86
Toluene	178.36	82.04	48.90	251.15	129.44	74.44	238.14	115.92	71.39
Total Individual HC	764.2	378.0	222.1	1066.5	576.3	331.2	1090.5	563.8	352.1
Total as % of THC, %	44.7	44.5	33.1	46.6	46.1	44.8	45.6	45.8	46.3
Organic Sulfides									
Carbonyl Sulfide	0.00	0.00	0.00	--	0.01	0.00	0.00	0.00	0.00
Methyl Sulfide	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.01	0.02	0.01	0.02	0.02	0.01	0.00	0.00	0.00
Monoethylamine	0.00	0.00	0.01	0.10	0.07	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-4. CAR 721 - RICH BEST IDLE (Cont'd).
1970 DODGE CHALLENGER

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		721-11	721-12	721-13	721-21	721-22	721-23	721-31	721-32	721-33
Other Elements										
Chromium	Cr					0.03				
Lead	Pb	12.97	11.09	9.53	10.26	8.30	11.16	10.41	10.72	10.26
Manganese	Mn					0.02				
Arsenic	As									
Mercury	Hg									
Bromine	Br	5.80	6.76	6.58	4.38	5.27	8.21	4.62	6.55	7.97
Phosphorus	P	0.11	0.08	0.07	0.10	0.05	0.06	0.10	0.07	0.06
Silicon	Si									
Cadmium	Cd	0.01	0.01	0.01		0.01			0.01	0.01
Aluminum	Al		0.01						0.01	
Sulfur	S	0.09	0.03	0.03	0.13	0.03	0.04	0.13	0.04	0.04
Sodium	Na	0.06	0.03	0.03	0.02	0.03	0.02	0.02	0.03	0.04
Fluorine	F									
Magnesium	Mg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Potassium	K									
Chlorine	Cl	4.13	5.14	5.75	2.16	5.52	7.84	2.44	6.03	7.98
Platinum	Pt									
Zinc	Zn	0.11	0.05	0.03	0.77	0.05	0.05	0.11	0.05	0.03
Copper	Cu									
Nickel	Ni									
Iron	Fe	0.58	0.36	0.10	0.99	0.39	0.30	0.47	0.48	0.25
Vanadium	V				0.01		0.01			
Titanium	Ti					0.00				
Barium	Ba									
Calcium	Ca	0.05	0.02	0.01	0.09	0.02	0.02	0.08	0.03	0.01

TABLE B-5. CAR 722 - 12 PERCENT IGNITION MISFIRE
1970 DODGE CHALLENGER

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	722-11	722-12	722-13	722-21	722-22	722-23	722-31	722-32	722-33
Barometer, mm hg	743.5	743.5	743.5	738.1	736.3	736.3	746.3	746.8	746.5
Humidity, g/kg	11.1	10.4	9.4	11.7	12.2	10.7	8.7	8.1	8.5
Temperature, °C	25.6	25.6	26.1	24.4	26.7	25.0	24.4	24.4	25.0
Total Fuel Sulfur, mg/km	20.66	15.03	13.71	21.88	16.22	15.63	21.12	16.38	15.17
Avg. Exh. Oxygen, %	1.25	1.45	1.63	4.10	3.83	3.76	3.81	--	--
Carbon Dioxide, g/km	258.7	202.6	189.2	245.9	197.6	196.0	242.0	201.3	191.4
Fuel Cons., ℓ/100 km	12.69	9.23	8.42	13.44	9.96	9.60	12.97	10.06	9.32
Regulated Emissions									
Hydrocarbons (THC), g/km	1.82	0.89	0.73	9.86	7.25	6.81	9.42	7.18	6.67
Carbon Monoxide, g/km	20.96	6.90	3.58	23.98	8.16	4.67	20.27	7.32	3.67
Oxides of Nitrogen, g/km	2.02	2.41	2.63	2.04	2.61	3.02	2.10	2.75	3.17
Particulates									
Total Particulates	102.6	62.13	50.33	101.59	79.14	37.77	71.12	68.62	66.00
Sulfate	0.17	0.14	0.08	0.19	0.22	0.33	0.17	0.48	0.45
Sulfate as % of TFS, %	0.27	0.31	0.19	0.29	0.45	0.70	0.27	0.98	0.99
Compound Group Totals									
Aldehydes & Ketones	--	7.8	8.5	47.9	--	85.1	55.5	72.8	102.6
Individual Hydrocarbons	734.5	368.6	--	1992.0	1275.3	1255.0	1901.2	1443.2	1256.4
Organic Sulfides	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Organic Amines	0.01	0.01	0.00	0.00	0.01	0.04	0.02	0.01	0.00
Other Compounds									
Ammonia	5.20	1.20	2.02	5.48	2.92	2.96	2.02	1.30	0.51
Cyanide & Cyanogen	4.76	3.10	5.95	2.37	0.30	0.81	3.14	0.52	1.64
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	2.16	1.28	1.19	1.96	2.27	2.35

TABLE B-5. CAR 722 - 12 PERCENT IGNITION MISFIRE (Cont'd). 1970 DODGE CHALLENGER

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	722-11	722-12	722-13	722-21	722-22	722-23	722-31	722-32	722-33
Aldehydes and Ketones									
Formaldehyde	--	7.31	7.92	43.56	--	70.85	50.24	64.51	88.56
Acetaldehyde	--	0.47	0.56	3.71	--	9.43	5.30	7.95	13.32
Acetone	--	0.00	0.00	0.61	--	3.25	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	--	0.00	0.00	0.00	--	0.00	0.00	0.00	0.00
Hexanaldehyde	--	0.00	0.00	0.00	--	1.52	0.00	0.30	0.75
Aldehydes and Ketones	--	7.8	8.5	47.9	--	85.1	55.5	72.8	102.6
Total as % of THC, %	--	0.9	1.2	0.5	--	1.2	0.6	1.0	1.5
Individual Hydrocarbons									
Methane	106.29	42.37	--	131.16	56.10	39.10	99.06	49.13	32.62
Ethylene	174.03	106.68	--	216.49	181.90	177.49	169.30	164.69	156.81
Ethane	16.88	10.22	--	20.38	16.35	14.86	18.53	15.36	13.48
Acetylene	116.33	55.17	--	129.26	60.50	48.97	146.33	80.56	65.06
Propane	4.01	1.48	--	2.61	1.62	1.33	2.38	1.62	1.17
Propylene	73.66	44.68	--	111.25	114.22	123.95	105.54	113.99	114.07
Benzene	59.26	29.95	--	115.35	62.99	73.51	129.01	75.42	68.14
Toluene	184.05	78.04	--	1265.53	781.64	775.78	1231.03	942.38	805.04
Total Individual HC	734.5	368.6	--	1992.0	1275.3	1255.0	1901.2	1443.2	1256.4
Total as % of THC, %	40.4	41.4	--	20.2	17.6	18.4	20.2	20.1	18.8
Organic Sulfides									
Carbonyl Sulfide	0.01	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
Methyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.01	0.00	0.00	0.00	0.01	0.02	0.01	0.01	0.00
Monoethylamine	0.00	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-5. CAR 722 - 12 PERCENT IGNITION MISFIRE (Cont'd).
1970 DODGE CHALLENGER

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		722-11	722-12	722-13	722-21	722-22	722-23	722-31	722-32	722-33
Other Elements										
Chromium	Cr									
Lead	Pb	17.46	14.55	10.09	18.41	14.72	11.32	12.94	9.87	9.13
Manganese	Mn				0.03					
Arsenic	As									
Mercury	Hg									
Bromine	Br	7.21	8.65	6.78	7.26	6.67	5.72	5.21	4.66	4.68
Phosphorus	P	0.14	0.08	0.06	0.10	0.07	0.06	0.06	0.05	0.05
Silicon	Si									
Cadmium	Cd		0.01	0.01	0.01		0.01		0.01	0.01
Aluminum	Al	0.09	0.04	0.01	0.06	0.03				
Sulfur	S	0.40	0.11	0.06	0.32	0.29	0.15	0.15	0.13	0.12
Sodium	Na	0.07	0.06	0.04	0.07	0.04	0.04	0.05	0.03	0.03
Fluorine	F									
Magnesium	Mg	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Potassium	K									
Chlorine	Cl	5.60	7.16	7.65	4.54	4.20	3.18	3.22	2.72	2.62
Platinum	Pt									
Zinc	Zn	0.28	0.10	0.06	0.28	0.21	0.09	0.15	0.07	0.06
Copper	Cu									
Nickel	Ni									
Iron	Fe	12.67	2.99	1.26	5.30	5.02	1.08	1.22	0.65	0.33
Vanadium	V								0.01	
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.12	0.03	0.02	0.07	0.04		0.03	0.02	0.01
Cobalt	Co	0.02								

TABLE B-6. CAR 723- LEAN IDLE
1970 DODGE CHALLENGER

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number,	PVM-ST	723-11	723-12	723-13	723-21	723-22	723-23	723-31	723-32	723-33
Barometer,	mm hg	748.3	748.3	748.0	745.5	744.5	744.0	739.4	738.4	737.6
Humidity,	g/kg	10.0	8.6	7.7	8.2	8.3	7.6	10.0	10.0	9.5
Temperature,	°C	26.1	26.1	26.7	27.2	25.6	25.6	26.7	26.7	26.1
Total Fuel Sulfur,	mg/km	20.02	15.22	13.99	20.33	15.43	14.12	20.59	15.37	13.97
Avg. Exh. Oxygen,	%	1.25	1.49	1.78	6.25	5.01	3.27	6.00	5.63	3.56
Carbon Dioxide,	g/km	255.3	209.0	194.7	257.5	209.0	193.5	259.6	207.6	190.7
Fuel Cons.,	ℓ/100 km	12.30	9.35	8.59	12.49	9.48	8.67	12.65	9.44	8.58
Regulated Emissions										
Hydrocarbons (THC),	g/km	1.60	0.86	0.63	3.36	1.50	0.90	3.28	1.48	0.97
Carbon Monoxide,	g/km	17.60	4.68	2.95	15.59	5.34	4.30	16.77	5.62	4.61
Oxides of Nitrogen,	g/km	1.87	2.68	2.80	1.77	2.37	2.54	1.82	2.60	2.69
Particulates										
Total Particulates		73.24	42.68	46.03	76.92	40.99	56.82	81.76	52.52	84.02
Sulfate		0.64	0.53	0.50	0.53	0.54	0.56	0.49	0.47	0.64
Sulfate as % of TFS,	%	1.07	1.16	1.19	0.87	1.17	1.32	0.79	1.02	1.53
Compound Group Totals										
Aldehydes & Ketones		18.2	18.1	11.3	42.0	24.4	16.4	44.3	27.4	9.9
Individual Hydrocarbons		657.8	346.0	263.9	883.5	450.6	334.1	894.9	451.9	336.7
Organic Sulfides		--	0.09	0.01	0.03	0.01	0.01	0.04	0.00	0.02
Organic Amines		0.08	0.09	0.06	0.12	0.00	0.00	0.05	0.04	0.04
Other Compounds										
Ammonia		2.20	2.74	1.69	--	0.80	3.00	3.65	1.87	3.45
Cyanide & Cyanogen		6.64	3.55	9.09	4.79	3.90	8.34	5.00	2.75	8.64
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-6. CAR 723 - LEAN IDLE (Cont'd)
1970 DODGE CHALLENGER

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	723-11	723-12	723-13	723-21	723-22	723-23	723-31	723-32	723-33
Aldehydes and Ketones									
Formaldehyde	11.34	13.87	7.21	33.50	21.64	13.87	37.52	22.69	8.87
Acetaldehyde	6.89	4.11	3.78	8.46	2.78	2.50	6.66	4.66	0.99
Acetone	0.00	0.13	0.28	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00
Aldehydes and Ketones	18.2	18.1	11.3	42.0	24.2	16.4	44.3	27.4	9.9
Total as % of THC, %	1.1	2.1	1.8	1.3	1.6	1.8	1.4	1.9	1.0
Individual Hydrocarbons									
Methane	89.08	31.79	20.94	68.83	30.78	26.43	76.41	31.42	27.60
Ethylene	153.89	99.07	80.53	196.20	116.78	92.80	190.05	114.39	91.54
Ethane	14.81	8.79	6.60	18.05	10.32	8.28	17.81	10.47	8.39
Acetylene	101.72	44.91	36.33	64.20	37.86	38.70	69.96	36.52	38.12
Propane	1.45	0.00	0.00	1.45	0.00	0.49	2.45	0.94	0.65
Propylene	66.43	42.39	34.43	100.98	56.92	42.06	94.58	54.55	40.98
Benzene	51.31	27.17	21.24	49.15	30.05	24.07	61.64	23.48	23.98
Toluene	179.10	91.83	63.83	384.60	167.91	101.26	381.97	180.14	105.46
Total Individual HC	657.8	346.0	263.9	883.5	450.6	334.1	894.9	451.9	336.7
Total as % of THC, %	41.1	40.2	41.9	26.3	30.0	37.1	27.3	30.5	34.7
Organic Sulfides									
Carbonyl Sulfide	--	0.09	0.01	0.03	0.01	0.00	0.02	0.00	0.02
Methyl Sulfide	--	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00
Ethyl Sulfide	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.03	0.06	0.03	0.10	0.00	0.00	0.05	0.04	0.04
Monoethylamine	0.03	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-6. CAR 723 - LEAN IDLE (Cont'd)
1970 DODGE CHALLENGER

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		723-11	723-12	723-13	723-21	723-22	723-23	723-31	723-32	723-33
Other Elements										
Chromium	Cr									
Lead	Pb	14.58	8.74	7.99	13.11	11.58	9.18	15.48	11.13	24.56
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	6.77	5.73	6.02	5.97	7.28	6.43	7.39	6.91	13.12
Phosphorus	P	0.11	0.06	0.05	0.08	0.07	0.06	0.07	0.07	0.09
Silicon	Si									
Cadmium	Cd	0.01						0.01	0.01	0.01
Aluminum	Al									
Sulfur	S	0.11	0.03	0.02	0.13	0.06	0.04	0.11	0.05	0.17
Sodium	Na	0.05	0.03	0.03	0.04	0.04	0.03	0.03	0.03	0.07
Fluorine	F									
Magnesium	Mg	0.01	0.01	0.01		0.01	0.01	0.01	0.01	0.01
Potassium	K									
Chlorine	Cl	3.60	4.82	5.91	2.77	4.71	5.24	3.14	3.87	5.92
Platinum	Pt									
Zinc	Zn	0.11	0.05		0.05	0.05	0.03	0.09	0.05	0.08
Copper	Cu	0.03								
Nickel	Ni									
Iron	Fe	1.00	0.30	0.12	0.39	0.24	0.09	0.35	0.22	1.29
Vanadium	V	0.01								
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.05	0.02		0.04	0.02	0.01	0.04	0.02	0.03

TABLE B-7. CAR 731 - RICH BEST IDLE
1970 CHEVROLET MONTE CARLO

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number,	PVM-ST	731-11	731-12	731-13	731-31	731-32	731-33	731-41	731-42	731-43
Barometer,	mm hg	750.3	749.3	748.5	744.7	744.5	744.0	741.4	740.9	740.4
Humidity,	g/kg	4.9	5.5	6.3	6.4	6.0	6.0	9.0	8.3	8.8
Temperature,	°C	24.4	28.9	30.0	23.9	25.0	27.8	25.6	25.6	26.1
Total Fuel Sulfur,	mg/km	29.26	20.30	18.10	29.48	20.32	18.14	29.71	20.48	17.89
Avg. Exh. Oxygen,	%	1.78	2.19	1.80	0.86	1.04	0.80	0.66	0.85	1.09
Carbon Dioxide,	g/km	387.5	279.5	247.2	335.7	261.2	242.6	334.5	262.7	239.1
Fuel Cons.,	ℓ/100 km	17.97	12.47	11.12	18.11	12.48	11.14	18.25	12.58	10.99
Regulated Emissions										
Hydrocarbons (THC),	g/km	2.00	1.28	1.27	2.89	1.60	1.43	2.94	1.67	1.54
Carbon Monoxide,	g/km	17.23	5.45	5.85	50.62	16.57	8.81	53.24	16.91	8.61
Oxides of Nitrogen,	g/km	2.70	3.30	3.55	2.30	3.08	3.50	2.25	3.43	3.71
Particulates										
Total Particulates		115.78	71.25	85.64	108.32	59.41	99.16	113.97	73.53	87.70
Sulfate		1.75	0.35	0.68	1.05	0.37	0.61	0.22	0.40	0.24
Sulfate as % of TFS,	%	1.99	0.57	1.25	1.19	0.61	1.12	0.25	0.65	0.45
Compound Group Totals										
Aldehydes & Ketones		89.4	--	--	61.1	36.6	29.7	42.6	31.4	49.2
Individual Hydrocarbons		769.9	539.2	577.2	1184.2	743.3	665.2	1181.0	763.4	688.6
Organic Sulfides		0.39	0.17	0.11	0.10	0.02	0.05	0.23	0.02	0.01
Organic Amines		0.06	0.11	0.07	0.04	0.06	0.06	0.31	0.27	0.49
Other Compounds										
Ammonia		6.98	2.41	1.89	2.95	8.83	4.07	2.42	2.02	2.19
Cyanide & Cyanogen		3.45	1.37	1.42	6.01	7.27	8.05	4.56	2.46	7.57
Hydrogen Sulfide		0.09	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride		--	--	--	--	--	--	0.00	0.00	0.00
Tetraethyllead		--	--	--	--	--	--	--	--	--
Ethylene Dibromide		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-7 . CAR 731 - RICH BEST IDLE (Cont'd)
1970 CHEVROLET MONTE CARLO

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	731-11	731-12	731-13	731-31	731-32	731-33	731-41	731-42	731-43
Aldehydes and Ketones									
Formaldehyde	80.05	--	--	53.68	34.03	28.05	36.86	31.32	44.87
Acetaldehyde	9.38	--	--	6.84	2.07	1.18	5.08	0.12	4.33
Acetone	0.00	--	--	0.62	0.49	0.51	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.00	--	--	0.00	0.00	0.00	0.64	0.00	0.00
Hexanaldehyde	0.00	--	--	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	89.4	--	--	61.1	36.6	29.7	42.6	31.4	49.2
Total as % of THC, %	4.5	--	--	2.1	2.3	2.1	1.4	1.9	3.1
Individual Hydrocarbons									
Methane	74.78	41.95	50.62	178.61	82.83	63.99	195.58	92.79	71.21
Ethylene	221.40	175.32	185.23	284.03	217.41	207.14	280.60	222.53	206.56
Ethane	17.69	14.01	15.45	25.10	19.95	19.05	25.49	20.73	20.49
Acetylene	81.59	57.92	73.56	161.04	98.69	92.54	169.62	105.78	100.99
Propane	10.22	0.00	1.20	2.71	1.61	1.30	2.08	1.05	0.90
Propylene	104.45	81.33	84.31	120.87	90.55	90.18	119.18	94.24	91.70
Benzene	55.05	39.14	42.02	86.39	57.99	49.15	89.18	61.64	49.36
Toluene	204.68	129.53	124.77	325.40	174.26	141.81	299.26	164.68	147.35
Total Individual HC	769.9	539.2	577.2	1184.2	743.3	665.2	1181.0	763.4	688.6
Total as % of THC, %	38.5	42.1	45.4	41.0	46.5	46.5	40.2	45.7	44.7
Organic Sulfides									
Carbonyl Sulfide	0.34	0.15	0.06	0.06	0.02	0.02	0.05	0.00	0.00
Methyl Sulfide	0.05	0.02	0.05	0.04	0.00	0.03	0.16	0.02	0.01
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Organic Amines									
Monomethylamine	0.06	0.11	0.04	0.04	0.05	0.06	0.31	0.27	0.30
Monoethylamine	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.19
Trimethylamine	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-7. CAR 731 - RICH BEST IDLE (Cont'd.)
1970 CHEVROLET MONTE CARLO

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		731-11	731-12	731-13	731-21	731-22	731-23	731-31	731-32	731-33
Other Elements										
Chromium	Cr									
Lead	Pb	22.26	16.99	12.57	18.93	13.95	11.47	14.18	13.38	9.25
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	9.37	1.08	6.91	8.69	8.86	6.27	6.62	8.30	5.45
Phosphorus	P	0.17	0.20	0.21	0.09	0.13	0.17	0.06	0.11	0.12
Silicon	Si		0.03							
Cadmium	Cd		0.01			0.01	0.01		0.01	
Aluminum	Al	0.42	0.26	0.09	0.44	0.07		0.05	0.02	
Sulfur	S	0.62	0.21	0.15	0.55	0.07	0.07	0.29	0.06	0.05
Sodium	Na	0.02	0.07		0.02	0.04	0.03	0.02	0.04	0.03
Fluorine	F									
Magnesium	Mg	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
Potassium	K									
Chlorine	Cl	2.48	3.33	1.99	2.63	3.09	2.32	2.28	2.86	1.82
Platinum	Pt									
Zinc	Zn	0.14	0.11	0.11		0.05	0.07		0.04	
Copper	Cu		0.02							
Nickel	Ni									
Iron	Fe	6.17	4.02	2.35	1.40	0.42	0.09	1.01	0.45	0.07
Vanadium	V			0.01			0.01			
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.08	0.07	0.07		0.03	0.03	0.04	0.05	0.02
Antimony	Sb			0.01						

TABLE B-8. CAR 732 - 12 PERCENT MISFIRE W/O VAC. ADVANCE
1970 CHEVROLET MONTE CARLO

	EMISSION RATE, MG/KM (Except as Noted)								
	W/O VAC. ADVANCE			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	732-11	732-12	732-13	732-21	732-22	732-23	732-31	732-32	732-33
Barometer, mm hg	744.5	744.0	743.7	741.7	740.9	740.7	740.2	739.9	739.6
Humidity, g/kg	9.4	9.9	9.9	7.4	7.1	7.2	11.9	10.2	10.4
Temperature, °C	26.1	26.7	26.7	26.1	23.9	26.7	25.6	26.1	27.2
Total Fuel Sulfur, mg/km	30.51	22.06	20.95	30.75	22.53	21.18	31.47	23.51	20.90
Avg. Exh. Oxygen, %	2.03	2.32	1.91	--	--	--	--	--	--
Carbon Dioxide, g/km	410.1	306.2	292.3	377.0	285.1	270.2	386.1	298.4	266.7
Fuel Cons., ℓ/100 km	18.74	13.55	12.87	18.89	13.84	13.01	19.33	14.44	12.84
Regulated Emissions									
Hydrocarbons (THC), g/km	1.73	1.05	0.69	13.79	9.65	8.69	14.29	10.06	8.51
Carbon Monoxide, g/km	14.93	5.08	4.43	13.87	5.35	4.57	13.68	5.13	4.55
Oxides of Nitrogen, g/km	1.46	1.56	1.67	1.85	1.85	1.99	1.95	1.93	1.79
Particulates									
Total Particulates	112.24	86.07	79.36	208.04	112.50	108.05	236.54	176.71	128.54
Sulfate	0.64	0.45	0.21	2.51	1.27	1.03	2.49	1.71	1.18
Sulfate as % of TFS, %	0.70	0.68	0.33	2.72	1.88	1.62	2.64	2.42	1.88
Compound Group Totals									
Aldehydes & Ketones	36.4	24.0	22.1	229.3	126.4	218.1	227.2	200.0	181.3
Individual Hydrocarbons	666.7	381.1	308.9	2840.7	1992.8	1976.6	3153.0	2188.7	1838.6
Organic Sulfides	0.05	0.01	0.04	0.03	0.01	0.02	0.12	0.00	0.00
Organic Amines	0.08	0.03	0.04	0.18	0.06	0.09	0.11	0.07	0.00
Other Compounds									
Ammonia	4.36	1.94	3.00	5.62	1.57	5.13	3.80	4.04	2.57
Cyanide & Cyanogen	2.99	1.26	7.66	1.78	0.52	1.99	1.73	0.40	2.50
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	3.48	2.03	2.93	2.55	1.63	4.21

TABLE B-8 . CAR 732 - 12 PERCENT MISFIRE W/O VAC. ADVANCE (Cont'd.)
1970 CHEVROLET MONTE CARLO

	EMISSION RATE, MG/KM (Except as Noted)								
	W/O VAC. ADVANCE			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	732-11	732-12	732-13	732-21	732-22	732-23	732-31	732-32	732-33
Aldehydes and Ketones									
Formaldehyde	30.74	21.48	9.17	181.54	103.31	183.03	174.39	169.75	163.31
Acetaldehyde	4.88	2.48	2.90	35.87	21.05	25.38	32.71	18.25	12.78
Acetone	0.81	0.08	0.00	8.05	0.00	8.16	14.04	8.71	3.65
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.00	0.00	0.00	1.99	0.00	1.53	3.66	1.52	1.55
Hexanaldehyde	0.00	0.00	0.00	1.86	2.03	0.00	2.43	1.34	0.00
Aldehydes and Ketones	36.4	24.0	22.1	229.3	126.4	218.1	227.2	200.0	181.3
Total as % of THC, %	2.1	2.3	3.2	1.7	1.3	2.5	1.6	2.0	2.1
Individual Hydrocarbons									
Methane	73.49	30.68	27.56	88.56	53.47	54.04	85.84	53.62	52.58
Ethylene	169.72	106.99	94.82	373.08	333.53	351.64	361.44	352.70	340.47
Ethane	13.74	7.88	6.82	30.81	25.64	26.05	29.33	26.46	26.25
Acetylene	82.67	41.78	41.12	93.72	64.49	70.56	94.65	66.05	67.66
Propane	0.68	0.83	0.00	3.76	2.48	2.17	1.44	1.32	1.57
Propylene	74.90	42.88	35.32	228.20	226.58	235.87	237.40	235.60	225.16
Benzene	48.76	29.80	26.64	139.59	94.46	100.43	261.50	110.54	108.26
Toluene	202.76	120.29	76.61	1882.99	1192.10	1135.84	2081.42	1342.37	1016.60
Total Individual HC	666.7	381.1	308.9	2840.7	1992.8	1976.6	3153.0	2188.7	1838.6
Total as % of THC, %	38.5	36.3	44.8	20.6	20.7	22.7	22.1	21.8	21.6
Organic Sulfides									
Carbonyl Sulfide	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Methyl Sulfide	0.03	0.01	0.03	0.02	0.00	0.01	0.11	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.04	0.02	0.03	0.18	0.06	0.09	0.11	0.07	0.00
Monoethylamine	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-8. CAR 732 - 12 PERCENT MISFIRE W/O VACUUM ADVANCE (Cont'd.)
1970 CHEVROLET MONTE CARLO

		EMISSION RATE, MG/KM (Except as Noted)								
		W/O VAC. ADVANCE			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		732-11	732-12	732-13	732-21	732-22	732-23	732-31	732-32	732-33
Other Elements										
Chromium	Cr									
Lead	Pb	21.41	20.00	15.28	20.62	16.30	17.31	50.14	33.35	21.43
Manganese	Mn								0.06	
Arsenic	As									
Mercury	Hg									
Bromine	Br	13.40	24.42	22.61	8.86	8.39	9.44	17.62	13.19	10.20
Phosphorus	P	0.11	0.11	0.10	0.13	0.10	0.12	0.32	0.21	0.13
Silicon	Si	0.03	0.03						0.12	
Cadmium	Cd	0.01	0.01	0.01		0.01		0.01	0.01	0.01
Aluminum	Al	0.13	0.31	0.13	0.09	0.12	0.07	0.60	0.84	0.26
Sulfur	S	0.51	0.32	0.18	0.68	0.47	0.44	1.88	1.30	0.64
Sodium	Na	0.07	0.08	0.06	0.08	0.05	0.05	0.14	0.16	0.07
Fluorine	F									
Magnesium	Mg	0.02	0.02	0.02	0.02	0.02	0.02	0.07	0.05	0.02
Potassium	K									
Chlorine	Cl	4.41	2.79	1.92	2.55	1.81	1.74	3.91	3.01	2.36
Platinum	Pt									
Zinc	Zn	0.12	0.14	0.08	0.11	0.08	0.08	0.40	0.39	0.21
Copper	Cu		0.05	0.02				0.10	0.04	0.04
Nickel	Ni									
Iron	Fe	12.10	8.86	4.48	5.56	7.15	6.13	24.89	33.49	15.13
Vanadium	V			0.01				0.01	0.01	
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.08	0.05	0.04	0.07	0.04	0.04	0.51	0.10	0.05
Antimony	Sb						0.01			
Cobalt	Co								0.04	

TABLE B-9. CAR 733-RICH BEST IDLE W/O VAC. ADVANCE
1970 CHEVROLET MONTE CARLO

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number,	PVM-ST	733-11	733-12	733-13	731-21	731-22	731-23	-	-	-
Barometer,	mm hg	748.0	749.3	749.0	737.1	737.1	736.3			
Humidity,	g/kg	5.5	5.3	5.7	15.0	12.1	10.8			
Temperature,	°C	24.4	25.0	28.3	27.8	30.6	30.0			
Total Fuel Sulfur,	mg/km	28.52	20.04	17.73	31.31	21.93	20.69			
Avg. Exh. Oxygen,	%	1.69	2.11	1.88	1.28	0.85	1.00			
Carbon Dioxide,	g/km	374.1	277.3	243.3	377.0	289.4	282.9			
Fuel Cons.,	ℓ/100 km	17.52	12.31	10.89	19.23	13.47	12.71			
Regulated Emissions										
Hydrocarbons (THC),	g/km	2.09	1.18	1.24	2.10	0.96	0.75			
Carbon Monoxide,	g/km	18.90	4.66	5.02	42.60	14.69	8.06			
Oxides of Nitrogen,	g/km	2.58	3.17	3.61	1.54	1.75	1.92			
Particulates										
Total Particulates		113.32	64.33	74.82	75.42	71.31	125.83			
Sulfate		0.46	0.23	0.56	0.21	0.15	0.34			
Sulfate as % of TFS,	%	0.54	0.38	1.05	0.22	0.23	0.55			
Compound Group Totals										
Aldehydes & Ketones		57.6	37.6	34.8	124.1	14.6	23.4			
Individual Hydrocarbons		809.8	509.4	506.5	972.9	537.8	423.0			
Organic Sulfides		0.05	0.02	0.01	0.17	0.00	0.01			
Organic Amines		0.00	0.00	0.00	0.00	0.13	0.15			
Other Compounds										
Ammonia		4.45	2.99	3.26	3.43	2.41	2.44			
Cyanide & Cyanogen		3.75	2.01	7.72	3.78	2.53	1.35			
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00	0.00			
Tetramethyllead		0.00	0.00	0.00	0.00	0.00	0.00			
Ethylene Dichloride		0.00	0.00	0.00	0.00	0.00	0.00			
Tetraethyllead		--	--	--	--	--	--			
Ethylene Dibromide		0.00	0.00	0.00	0.00	0.00	0.00			

TABLE B-9. CAR 733-RICH BEST IDLE W/O VAC. ADVANCE (Cont'd)
1970 CHEVROLET MONTE CARLO

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	733-11	733-12	733-13	731-21	731-22	731-23	-	-	-
Aldehydes and Ketones									
Formaldehyde	53.48	34.77	30.87	114.35	13.33	17.91			
Acetaldehyde	4.09	2.79	3.71	9.76	1.24	4.30			
Acetone	0.00	0.00	0.00	0.00	0.00	0.00			
Isobutyraldehyde	--	--	--	--	--	--			
Methyl Ethyl Ketone	0.00	0.00	0.23	0.00	0.00	0.00			
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	1.20			
Aldehydes and Ketones	57.6	37.6	34.8	124.1	14.6	23.4			
Total as % of THC, %	2.8	3.2	2.8	5.9	1.5	3.1			
Individual Hydrocarbons									
Methane	94.17	37.88	40.50	170.14	75.97	55.56			
Ethylene	215.50	167.96	164.68	234.03	148.34	127.83			
Ethane	18.83	13.70	14.31	20.25	12.86	11.02			
Acetylene	97.08	54.05	59.50	159.31	89.38	71.88			
Propane	1.69	1.14	1.04	1.36	0.76	0.39			
Propylene	99.71	74.91	72.16	90.15	52.96	45.55			
Benzene	58.82	39.71	37.94	78.68	50.14	36.59			
Toluene	224.02	120.05	116.41	218.93	107.37	74.21			
Total Individual HC	809.8	509.4	506.5	972.9	537.8	423.0			
Total as % of THC, %	38.7	43.2	40.8	46.3	56.0	56.4			
Organic Sulfides									
Carbonyl Sulfide	0.01	0.01	0.00	0.12	0.00	0.00			
Methyl Sulfide	0.03	0.01	0.01	0.05	0.00	0.01			
Ethyl Sulfide	0.01	0.00	0.00	0.00	0.00	0.00			
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00			
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.00	0.13	0.14			
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00			
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.01			
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00			
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00			

TABLE B-9. CAR 733 - RICH BEST IDLE W/O VAC. ADVANCE (Cont'd.)
1970 CHEVROLET MONTE CARLO

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		733-11	733-12	733-13	731-21	731-22	731-23	-	-	-
Other Elements										
Chromium	Cr									
Lead	Pb	18.26	17.52	10.77	30.27	28.42	38.91			
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	8.41	11.90	6.53	14.77	24.60	39.04			
Phosphorus	P	0.13	0.14	0.13	0.14	0.11	0.19			
Silicon	Si									
Cadmium	Cd		0.01			0.02	0.02			
Aluminum	Al	0.02	0.04		0.19	0.32	0.44			
Sulfur	S	0.44	0.07	0.05	0.61	0.19	0.30			
Sodium	Na	0.02	0.06	0.05	0.07	0.10	0.18			
Fluorine	F									
Magnesium	Mg	0.01	0.02	0.01	0.03	0.03	0.04			
Potassium	K									
Chlorine	Cl	2.50	3.23	1.94	4.07	3.45	3.61			
Platinum	Pt									
Zinc	Zn		0.05	0.05	0.14	0.09	0.15			
Copper	Cu						0.05			
Nickel	Ni									
Iron	Fe	0.68	0.31	0.11	6.77	3.87	6.88			
Vanadium	V		0.01				0.01			
Titanium	Ti	0.01								
Barium	Ba									
Calcium	Ca	0.10	0.05	0.04	0.10	0.04	0.06			

TABLE B-10. CAR 741 - RICH BEST IDLE
1970 Ford Fairlane

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	741-11	741-12	741-13	741-21	741-22	741-23	741-31	741-32	741-33
Barometer, mm hg	740.9	740.9	740.9	739.9	740.2	740.2	739.4	739.9	739.9
Humidity, g/kg	12.9	9.9	10.9	11.9	11.1	11.9	12.1	11.7	10.4
Temperature, °C	25.0	25.0	26.1	25.6	25.6	25.6	25.0	26.1	27.2
Total Fuel Sulfur, mg/km	26.93	20.79	18.90	29.37	22.19	18.71	29.26	21.05	18.54
Avg. Exh. Oxygen, %	1.54	1.50	1.36	1.03	0.95	1.01	--	1.02	1.25
Carbon Dioxide, g/km	358.2	283.5	256.9	319.5	280.1	248.8	314.5	260.3	246.8
Fuel Cons., ℓ/100 km	16.54	12.77	11.61	18.04	13.63	11.49	17.97	12.93	11.39
Regulated Emissions									
Hydrocarbons (THC), g/km	2.53	1.79	1.79	3.77	2.18	1.81	3.73	2.01	1.68
Carbon Monoxide, g/km	13.55	6.33	6.04	57.94	20.59	9.26	60.19	23.06	9.36
Oxides of Nitrogen, g/km	3.94	4.58	4.79	3.43	4.87	4.54	3.21	4.11	4.05
Particulates									
Total Particulates	119.38	70.00	90.48	116.82	118.19	110.23	106.73	85.89	90.93
Sulfate	0.30	0.54	0.37	0.46	0.49	0.49	0.43	0.52	0.46
Sulfate as % of TFS, %	0.37	0.87	0.65	0.52	0.74	0.87	0.49	0.82	0.83
Compound Group Totals									
Aldehydes & Ketones	29.1	7.0	33.9	26.8	29.2	20.8	18.6	23.5	23.5
Individual Hydrocarbons	--	664.2	--	1662.8	982.4	813.3	1734.4	971.2	802.5
Organic Sulfides	0.00	0.00	0.00	0.13	0.03	0.00	0.38	0.01	0.00
Organic Amines	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00
Other Compounds									
Ammonia	2.89	3.11	3.99	2.08	4.52	5.73	7.35	7.50	9.95
Cyanide & Cyanogen	0.68	0.70	0.83	0.86	0.47	1.00	3.47	0.40	0.81
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-10. CAR 741 - RICH BEST IDLE (Cont'd.)
1970 Ford Fairlane

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	741-11	741-12	741-13	741-21	741-22	741-23	741-31	741-32	741-33
Aldehydes and Ketones									
Formaldehyde	26.85	6.66	32.94	23.01	26.85	19.15	17.21	21.54	21.51
Acetaldehyde	2.25	0.32	0.98	3.79	2.37	1.68	1.32	1.84	1.98
Acetone	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.10	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	29.1	7.0	33.9	26.8	29.2	20.8	18.6	23.5	23.5
Total as % of THC, %	1.2	0.4	1.9	0.7	1.3	1.1	0.5	1.2	1.4
Individual Hydrocarbons									
Methane	--	49.06	--	349.13	133.47	80.86	356.83	132.70	78.52
Ethylene	--	193.82	--	360.09	278.76	245.27	377.22	274.46	248.35
Ethane	--	17.54	--	32.44	26.18	24.89	32.40	24.48	23.92
Acetylene	--	50.20	--	337.10	145.50	104.50	351.41	139.68	101.07
Propane	--	1.77	--	3.10	1.83	1.42	3.33	2.03	1.64
Propylene	--	104.43	--	157.00	128.90	120.57	161.12	127.11	119.34
Benzene	--	54.79	--	95.27	61.80	60.29	91.25	60.11	50.88
Toluene	--	192.56	--	328.65	205.91	175.53	360.80	210.61	178.79
Total Individual HC	--	664.2	--	1662.8	982.4	813.3	1734.4	971.2	802.5
Total as % of THC, %	--	37.1	--	44.1	45.1	44.9	46.5	48.3	47.8
Organic Sulfides									
Carbonyl Sulfide	0.00	0.00	0.00	0.13	0.03	0.00	0.38	0.00	0.00
Methyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Monoethylamine	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-10. CAR 741 - RICH BEST IDLE (Cont'd.)
1970 Ford Fairlane

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		741-11	741-12	741-13	741 -21	741-22	741-23	741-31	741-32	741-33
Other Elements										
Chromium	Cr									
Lead	Pb	21.69	32.49	22.48	28.86	24.64	24.67	21.15	23.81	25.49
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	9.05	16.00	14.95	12.62	14.09	16.13	9.93	13.84	14.33
Phosphorus	P	0.25	0.31	0.14	0.23	0.19	0.10	0.18	0.19	0.07
Silicon	Si									
Cadmium	Cd	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01
Aluminum	Al		0.06	0.02		0.02	0.05		0.04	0.06
Sulfur	S	0.16	0.25	0.08	0.21	0.12	0.09	0.18	0.11	0.04
Sodium	Na	0.08	0.14	0.07	0.10	0.09	0.10	0.05	0.08	0.06
Fluorine	F									
Magnesium	Mg	0.02	0.06	0.02	0.03	0.03	0.02	0.02	0.03	0.01
Potassium	K									
Chlorine	Cl	4.36	7.08	6.45	7.62	5.69	6.38	5.75	6.25	5.23
Platinum	Pt									
Zinc	Zn	0.15	0.30	0.07	0.15	0.12	0.08	0.06	0.10	0.04
Copper	Cu						0.02			
Nickel	Ni									
Iron	Fe	1.01	1.20	0.34	0.63	0.34	0.26	1.64	0.76	0.40
Vanadium	V						0.01			
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.18	0.30	0.08	0.17	0.14	0.06	0.14	0.14	0.04

TABLE 11 . CAR 742 - 12 PERCENT IGNITION MISFIRE AND 10° RETARD
1970 Ford Fairlane

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION[a]					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number,	PVM-ST	744-11	744-12	744-13	742-21	742-22	742-23	742-31	742-32	742-33
Barometer,	mm hg	748.0	747.8	747.8	742.7	743.5	743.7	740.4	740.7	740.7
Humidity,	g/kg	8.9	8.9	8.5	13.4	11.8	11.1	12.1	10.9	11.1
Temperature,	°C	23.9	23.9	25.0	25.6	25.6	25.6	25.0	24.4	25.6
Total Fuel Sulfur,	mg/km	26.05	19.44	17.11	31.06	23.74	20.66	31.14	24.05	19.85
Avg. Exh. Oxygen,	%	1.21	1.33	1.41	3.53	3.44	3.34	3.34	3.54	3.41
Carbon Dioxide,	g/km	346.4	266.2	233.0	372.9	290.5	254.8	374.6	296.0	246.1
Fuel Cons.,	ℓ/100 km	16.00	11.94	10.51	19.08	14.58	12.69	19.13	14.77	12.19
Regulated Emissions										
Hydrocarbons (THC),	g/km	2.28	1.50	1.46	15.15	11.61	10.29	14.71	11.65	9.82
Carbon Monoxide,	g/km	13.54	5.67	5.47	16.57	9.09	6.31	17.16	8.37	5.30
Oxides of Nitrogen,	g/km	3.53	4.08	3.72	3.56	4.13	3.97	3.28	4.14	3.84
Particulates										
Total Particulates		85.51	76.45	64.98	185.99	125.02	123.41	172.54	124.14	116.14
Sulfate		0.20	0.37	0.29	0.68	0.74	0.66	1.18	0.90	0.96
Sulfate as % of TFS,	%	0.26	0.63	0.56	0.73	1.04	1.06	1.26	1.25	1.61
Compound Group Totals										
Aldehydes & Ketones		19.1	7.2	7.9	92.3	117.5	42.0	--	--	--
Individual Hydrocarbons		839.8	654.5	646.6	3198.4	2500.6	2253.8	3934.4	3080.2	2730.9
Organic Sulfides		0.00	0.00	0.00	--	--	--	0.06	0.06	0.11
Organic Amines		0.01	0.00	0.00	0.02	0.02	0.05	0.00	0.02	0.05
Other Compounds										
Ammonia		3.79	2.44	5.96	18.46	14.66	19.45	14.74	6.61	0.90
Cyanide & Cyanogen		0.94	2.08	7.60	0.51	0.28	0.89	0.29	0.28	0.56
Hydrogen Sulfide		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide		0.00	0.00	0.00	2.45	3.18	1.89	5.17	4.11	5.39

TABLE 11. CAR 742 - 12 PERCENT IGNITION MISFIRE AND 10° RETARD (Cont'd.)
1970 Ford Fairlane

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION^a					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	744-11	744-12	744-13	742-21	742-22	742-23	742-31	742-32	742-33
Aldehydes and Ketones									
Formaldehyde	18.08	6.46	7.93	87.97	108.04	32.43	--	--	--
Acetaldehyde	0.79	0.58	0.00	2.44	2.74	7.47	--	--	--
Acetone	0.26	0.19	0.00	0.14	5.99	0.00	--	--	--
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.73	1.26	--	--	--
Hexanaldehyde	0.00	0.00	0.00	1.72	0.00	0.84	--	--	--
Aldehydes and Ketones	19.1	7.2	7.9	92.3	117.5	42.0	--	--	--
Total as % of THC, %	0.8	0.5	0.5	0.6	1.0	0.4	--	--	--
Individual Hydrocarbons									
Methane	77.33	51.92	51.31	109.61	82.20	70.12	109.47	77.22	63.00
Ethylene	245.51	210.68	202.94	371.09	376.30	351.33	373.20	396.32	354.43
Ethane	23.11	18.94	19.03	31.24	30.53	29.50	31.91	31.72	29.31
Acetylene	76.75	65.04	68.54	104.70	84.41	82.09	114.60	81.96	84.38
Propane	2.86	1.61	1.43	2.99	2.59	2.35	4.84	8.95	10.97
Propylene	129.95	106.65	101.36	251.94	268.52	248.45	268.13	295.17	256.50
Benzene	52.54	43.61	43.55	183.94	148.54	127.04	181.23	157.41	127.69
Toluene	231.72	156.00	158.48	2142.93	1507.48	1342.96	2851.04	2031.42	1804.63
Total Individual HC	839.8	654.5	646.6	3198.4	2500.6	2253.8	3934.4	3080.2	2730.9
Total as % of THC, %	36.8	43.6	44.3	21.1	21.5	21.9	26.7	26.4	27.8
Organic Sulfides									
Carbonyl Sulfide	0.00	0.00	0.00	--	--	--	0.06	0.06	0.07
Methyl Sulfide	0.00	0.00	0.00	--	--	--	0.00	0.00	0.04
Ethyl Sulfide	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	--	--	--	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.00	0.00	0.00	0.02	0.02	0.05	0.00	0.02	0.05
Monoethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 11. CAR 742 - 12 PERCENT IGNITION MISFIRE AND 10° RETARD (Cont'd.)
1970 Ford Fairlane

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION[a]					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		744-11	744-12	744-13	742-21	742-22	742-23	742-31	742-32	742-33
Other Elements										
Chromium	Cr									
Lead	Pb	18.63	27.59	10.03	32.99	17.89	20.05	33.81	18.07	16.16
Manganese	Mn				0.02					
Arsenic	As									
Mercury	Hg									
Bromine	Br	8.32	16.16	7.07	12.48	8.23	10.16	13.61	8.04	8.02
Phosphorus	P	0.24	0.28	0.07	0.28	0.17	0.13	0.27	0.15	0.12
Silicon	Si				0.04					
Cadmium	Cd		0.02	0.01		0.01	0.01	0.01	0.01	0.01
Aluminum	Al		0.05		0.18	0.04	0.03	0.03		
Sulfur	S	0.12	0.13	0.02	0.88	0.37	0.36	0.75	0.32	0.27
Sodium	Na	0.06	0.11	0.04	0.05	0.07	0.06	0.09	0.06	0.04
Fluorine	F									
Magnesium	Mg	0.02	0.03	0.01	0.03	0.02	0.02	0.04	0.02	0.01
Potassium	K									
Chlorine	Cl	3.13	5.61	3.09	4.50	2.70	2.83	5.38	2.93	2.83
Platinum	Pt									
Zinc	Zn	0.10	0.17	0.03	0.16	0.12	0.08	0.20	0.10	0.06
Copper	Cu				0.03		0.04	0.04		0.04
Nickel	Ni									
Iron	Fe	0.18	0.21	0.02	16.59	3.58	5.18	8.66	1.90	1.04
Vanadium	V				0.01					
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.19	0.22	0.03	0.17	0.11	0.06	0.20	0.10	0.05
Cobalt	Co				0.01					

TABLE B-12. CAR 743 - LEAN IDLE
1970 Ford Fairlane

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	743-11	743-12	743-13	743-21	743-22	743-23	743-31	743-32	743-33
Barometer, mm hg	742.7	743.0	742.7	747.0	747.3	747.0	748.8	748.5	748.3
Humidity, g/kg	10.9	10.9	11.1	7.2	7.4	7.2	11.5	10.0	9.6
Temperature, °C	24.4	24.4	25.6	25.0	24.4	25.0	24.4	24.4	25.6
Total Fuel Sulfur, mg/km	26.54	20.42	17.71	25.97	19.80	17.13	26.11	21.02	18.22
Avg. Exh. Oxygen, %	1.36	1.45	1.47	4.33	3.97	2.98	4.39	3.55	2.20
Carbon Dioxide, g/km	355.8	279.1	241.4	348.9	271.2	234.9	349.6	287.3	249.1
Fuel Cons., ℓ/100 km	16.30	12.54	10.88	15.95	12.16	10.52	16.04	12.91	11.19
Regulated Emissions									
Hydrocarbons (THC), g/km	2.24	1.60	1.52	3.08	2.15	1.66	3.46	2.21	1.78
Carbon Monoxide, g/km	12.02	6.17	5.56	9.55	4.35	3.95	9.69	5.14	4.76
Oxides of Nitrogen, g/km	3.52	4.41	4.22	3.78	4.24	3.96	3.69	5.17	4.71
Particulates									
Total Particulates	81.82	89.15	64.41	87.84	85.34	79.26	94.25	96.58	80.53
Sulfate	0.32	0.57	0.27	0.56	0.67	0.31	0.43	0.69	0.23
Sulfate as % of TFS, %	0.40	0.93	0.51	0.72	1.13	0.60	0.55	1.09	0.42
Compound Group Totals									
Aldehydes & Ketones	20.3	34.8	39.2	9.6	8.2	12.5	31.7	12.3	16.6
Individual Hydrocarbons	857.5	704.2	693.8	1005.6	711.8	653.7	1053.2	766.6	714.4
Organic Sulfides	--	--	--	--	--	--	0.10	0.05	0.00
Organic Amines	0.10	0.04	0.01	0.03	0.00	0.00	0.03	0.02	0.03
Other Compounds									
Ammonia	7.67	--	6.94	2.48	2.33	4.59	4.56	7.05	4.23
Cyanide & Cyanogen	1.03	2.21	6.98	1.83	0.67	2.54	2.20	0.88	5.38
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-12. CAR 743 - LEAN IDLE (Cont'd.)
1970 Ford Fairlane

	EMISSION RATE, MG/KM (Except as Noted)								
	UNMODIFIED			WITH MALFUNCTION CONDITION					
	FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST	743-11	743-12	743-13	743-21	743-22	743-23	743-31	743-32	743-33
Aldehydes and Ketones									
Formaldehyde	18.94	31.91	37.43	9.04	8.02	11.90	29.03	10.64	15.59
Acetaldehyde	1.21	2.33	1.20	0.47	0.19	0.63	2.69	1.61	1.05
Acetone	0.19	0.52	0.59	0.09	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--	--	--	--
Methyl Ethyl Ketone	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes and Ketones	20.3	34.8	39.2	9.6	8.2	12.5	31.7	12.3	16.6
Total as % of THC, %	0.9	2.2	2.6	0.3	0.4	0.8	0.9	0.6	0.9
Individual Hydrocarbons									
Methane	76.39	56.20	51.26	67.62	45.93	43.78	66.62	51.79	49.81
Ethylene	250.10	221.35	212.31	294.45	237.50	208.59	291.46	249.06	224.21
Ethane	23.49	20.72	20.38	23.89	18.55	17.20	24.18	20.09	19.47
Acetylene	77.94	72.53	74.09	63.98	62.06	65.47	55.89	59.51	67.91
Propane	2.26	1.67	1.52	2.56	1.76	1.17	2.49	1.94	1.53
Propylene	134.46	113.74	109.44	163.56	124.23	105.45	162.65	131.13	115.65
Benzene	54.28	45.95	52.52	56.69	40.99	41.69	62.65	48.56	46.05
Toluene	238.57	172.03	172.32	332.89	180.80	170.32	387.25	204.56	189.72
Total Individual HC	857.5	704.2	693.8	1005.6	711.8	653.7	1053.2	766.6	714.4
Total as % of THC, %	38.3	44.0	45.6	32.6	33.1	39.4	30.4	34.7	40.1
Organic Sulfides									
Carbonyl Sulfide	--	--	--	--	--	--	0.10	0.05	0.00
Methyl Sulfide	--	--	--	--	--	--	0.00	0.00	0.00
Ethyl Sulfide	--	--	--	--	--	--	0.00	0.00	0.00
Methyl Disulfide	--	--	--	--	--	--	0.00	0.00	0.00
Organic Amines									
Monomethylamine	0.07	0.03	0.01	0.03	0.00	0.00	0.03	0.01	0.03
Monoethylamine	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE B-12. CAR 743 - LEAN IDLE (Cont'd.)
1970 Ford Fairlane

		EMISSION RATE, MG/KM (Except as Noted)								
		UNMODIFIED			WITH MALFUNCTION CONDITION					
		FTP	SET	HFET	FTP	SET	HFET	FTP	SET	HFET
Test Number, PVM-ST		743-11	743-12	743-13	743-21	743-22	743-23	743-31	743-32	743-33
Other Elements										
Chromium	Cr									
Lead	Pb	17.84	32.31	19.99	17.05	23.46	18.87	21.60	36.86	28.70
Manganese	Mn									
Arsenic	As									
Mercury	Hg									
Bromine	Br	9.08	20.18	14.11	8.16	13.62	13.21	10.12	23.68	20.24
Phosphorus	P	0.21	0.25	0.11	0.19	0.22	0.11	0.22	0.24	0.15
Silicon	Si									
Cadmium	Cd		0.02	0.01		0.01	0.01	0.01	0.02	0.01
Aluminum	Al		0.09	0.04		0.01	0.02		0.12	0.05
Sulfur	S	0.10	0.15	0.03	0.13	0.15	0.06	0.09	0.17	0.06
Sodium	Na	0.05	0.14	0.07	0.07	0.09	0.08	0.06	0.12	0.07
Fluorine	F									
Magnesium	Mg	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.04	0.02
Potassium	K									
Chlorine	Cl	3.73	6.87	6.28	3.05	4.53	5.91	3.51	6.35	6.61
Platinum	Pt									
Zinc	Zn	0.08	0.18	0.04	0.10	0.13	0.05	0.09	0.14	0.06
Copper	Cu		0.02			0.03		0.02		0.03
Nickel	Ni									
Iron	Fe	0.58	0.79	0.08	0.29	0.34	0.11	0.29	0.33	0.12
Vanadium	V									
Titanium	Ti									
Barium	Ba									
Calcium	Ca	0.16	0.22	0.06	0.16	0.17	0.07	0.16	0.18	0.08

APPENDIX C

FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS

TABLE C-1. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 711 - Rich Idle

	Emissions in mg/km					
	Unmodified		Malfunction			
	711-11		711-21		711-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	125.63	101.21	104.22	83.15	98.70	76.45
Sulfates	0.30	0.62	0.83	0.33	0.84	0.61
Ammonia	2.58	2.84	2.02	2.17	3.79	3.90
Cyanides & Cyanogen	3.38	3.34	5.60	6.81	5.25	4.54
Hydrogen Sulfide	0.36	0.00	0.00	0.00	0.23	0.00
Aldehydes & Ketones						
Formaldehyde	35.61	37.26	34.01	27.23	31.00	33.19
Acetaldehyde	5.46	5.92	6.16	5.17	6.46	6.72
Acetone	0.09	1.05	9.56	9.88	2.82	4.65
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.40	0.62	0.31	0.21	0.41	0.51
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Organic Sulfides						
Carbonyl sulfide	0.08	0.06	0.01	0.02	0.02	0.01
Methyl sulfide	0.00	0.04	0.00	0.02	0.00	0.01
Ethyl sulfide	0.00	0.00	0.00	0.00	0.00	0.01
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.01	0.06	0.07	0.05	0.05	0.03
Monoethylamine & dimethylamine	0.00	0.00	0.03	0.01	0.30	0.15
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.05
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	33.87	3.95	5.88	3.34	32.09	10.44	10.08	9.41	32.45	10.83	11.40	10.07
Ethylene	37.07	12.05	17.46	10.93	37.69	18.08	22.02	16.87	37.10	18.94	25.48	17.79
Ethane	3.18	1.04	1.67	0.93	3.13	1.58	1.91	1.48	3.12	1.58	2.23	1.49
Acetylene	52.61	6.06	8.91	5.31	46.16	12.50	14.16	11.61	48.63	13.72	17.38	12.94
Propane	0.32	0.19	0.22	0.18	0.32	0.19	0.18	0.15	0.24	0.15	1.68	2.56
Propylene	14.03	5.04	7.27	4.62	14.60	6.79	8.53	6.28	14.46	7.13	10.04	6.64
Benzene	15.87	4.07	6.61	3.86	14.10	7.37	8.09	7.14	13.66	7.88	8.72	7.35
Toluene	78.90	20.58	43.57	16.88	47.74	19.03	21.64	17.51	39.60	18.04	21.20	15.90
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-2. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 712 - 12 Percent Misfire

	Emissions in mg/km					
	Unmodified		Malfunction			
	712-11		712-21		712-41	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	108.25	75.70	103.32	94.32	152.69	86.80
Sulfates	1.03	0.75	0.26	0.26	0.64	0.85
Ammonia	4.60	5.15	1.39	2.12	1.90	1.99
Cyanides & Cyanogen	3.56	3.51	0.65	1.65	1.87	0.56
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	30.11	24.97	163.00	229.52	253.15	180.16
Acetaldehyde	4.70	2.07	20.17	37.54	45.65	30.31
Acetone	0.93	0.67	7.79	13.48	8.64	3.87
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.00	0.00	3.20	6.38	3.03	1.95
Hexanaldehyde	0.00	0.00	0.00	3.02	4.41	3.30
Organic Sulfides						
Carbonyl sulfide	0.01	0.02	0.02	0.04	0.00	0.01
Methyl sulfide	0.02	0.05	0.03	0.02	0.01	0.02
Ethyl sulfide	0.01	0.01	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.09	0.12	0.36	0.37	0.48	0.27
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00	0.00	0.12
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	19.11	1.50	3.77	1.38	26.87	4.07	6.79	3.51	26.15	5.37	7.24	4.58
Ethylene	28.61	10.02	17.98	9.76	54.28	25.26	42.16	23.98	62.82	30.41	46.89	29.35
Ethane	2.36	0.73	1.44	0.68	4.52	2.13	3.37	1.90	5.36	2.66	3.73	2.43
Acetylene	24.60	3.97	7.79	3.66	37.66	6.36	9.94	5.37	37.45	8.06	11.33	6.88
Propane	0.18	0.00	0.13	0.00	0.40	0.25	0.31	0.21	0.39	0.23	0.33	0.22
Propylene	11.63	4.35	7.74	4.16	32.74	17.49	29.16	16.92	37.69	20.18	31.15	19.82
Benzene	10.02	3.15	5.39	2.79	31.61	19.46	28.92	16.63	35.89	15.81	22.23	15.94
Toluene	28.13	8.29	18.11	7.01	303.23	181.46	248.65	177.50	346.35	198.82	253.08	208.22
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	--	--	--	--	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.16	0.05	0.07	0.03	0.07	0.02	0.05	0.04

TABLE C-3. FTP INDIVIDUAL SAMPLE EMISSION RESULTS
Test 712-31 - 12 Percent Misfire Plus Unknown Malfunction

	Emissions in mg/km	
	COLD-UDDS	HOT-UDDS
Total Particulate	139.51	89.09
Sulfates	0.98	0.97
Ammonia	4.40	5.07
Cyanides & Cyanogen	1.22	1.76
Hydrogen Sulfide	0.23	0.23
Aldehydes & Ketones		
Formaldehyde	136.47	257.13
Acetaldehyde	11.68	22.55
Acetone	2.44	6.39
Isobutyraldehyde	--	--
Methyl ethyl ketone	1.34	3.01
Hexanaldehyde	0.00	114.90
Organic Sulfides		
Carbonyl sulfide	0.02	0.01
Methyl sulfide	0.06	0.01
Ethyl sulfide	0.01	0.00
Methyl disulfide	0.00	0.00
Organic Amines		
Monomethylamine	0.20	0.44
Monoethylamine & dimethylamine	0.01	0.00
Trimethylamine	0.00	0.00
Diethylamine	0.00	0.00
Triethylamine	0.00	0.00

	Emissions in ppm			
	COLD-UDDS		HOT-UDDS	
	1	2	3	4
Individual Hydrocarbons				
Methane	30.97	5.83	8.73	4.94
Ethylene	68.84	33.21	55.58	32.42
Ethane	6.11	3.01	4.70	2.69
Acetylene	41.25	7.50	11.07	6.28
Propane	0.74	0.27	0.37	0.21
Propylene	42.79	23.33	39.84	23.58
Benzene	60.73	27.21	42.11	37.44
Toluene	804.20	517.08	748.71	494.06
Lead Components				
Tetramethyllead	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00
Tetraethyllead	--	--	--	--
Ethylene Dibromide	0.25	0.12	0.18	0.10

TABLE C-4. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 721 - Rich Idle

	Emissions in mg/km					
	Unmodified		Malfunction			
	721-11		721-21		721-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	86.33	54.85	34.85	23.60	131.76	65.00
Sulfates	0.23	0.11	2.03	0.75	1.43	0.34
Ammonia	1.52	1.14	5.36	3.36	6.38	3.14
Cyanides & Cyanogen	4.65	3.87	--	--	10.44	9.52
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	9.35	5.70	9.30	11.20	10.87	5.64
Acetaldehyde	0.00	0.00	1.31	0.72	1.85	2.22
Acetone	0.00	0.00	0.27	0.00	0.00	0.45
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Organic Sulfides						
Carbonyl sulfide	0.00	0.00	--	0.01	0.00	0.00
Methyl sulfide	0.00	0.00	--	0.03	0.00	0.00
Ethyl sulfide	0.00	0.00	--	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	--	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.02	0.05	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.01	0.00	0.15	0.07	0.00	0.00
Trimethylamine	0.00	0.00	0.02	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	26.10	4.25	7.96	4.41	23.24	14.17	14.58	14.27	28.26	15.11	16.73	14.96
Ethylene	33.63	12.54	18.49	11.98	33.98	21.87	26.09	21.40	35.17	21.75	27.25	21.69
Ethane	2.75	1.15	1.60	1.07	3.04	1.78	2.28	1.72	3.22	1.82	2.44	1.86
Acetylene	62.09	10.07	16.84	9.54	30.32	15.71	18.99	16.45	39.27	16.74	21.48	17.13
Propane	0.18	0.00	0.02	0.00	0.28	0.19	0.23	0.18	0.30	0.20	0.24	0.20
Propylene	12.88	5.31	7.77	4.96	14.04	8.09	10.11	7.71	14.18	7.94	10.40	7.91
Benzene	10.28	4.24	6.32	4.08	10.78	9.26	9.11	7.98	11.18	9.29	8.54	7.52
Toluene	32.42	15.10	22.83	13.74	36.70	22.73	29.57	22.69	38.80	20.78	28.16	21.06
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-5. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 722 - 12 Percent Misfire

	Emissions in mg/km					
	Unmodified		Malfunction			
	722-11		722-21		722-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	141.70	73.06	116.00	90.72	73.28	69.49
Sulfates	0.33	0.05	0.26	0.14	0.18	0.16
Ammonia	4.33	5.85	8.76	3.01	1.96	2.06
Cyanides & Cyanogen	5.33	4.33	3.21	1.74	3.76	2.67
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	--	6.65	35.47	49.67	29.95	65.54
Acetaldehyde	--	0.00	2.24	4.82	4.88	5.62
Acetone	--	0.52	0.56	0.65	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	--	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	--	0.00	0.00	0.00	0.00	0.00
Organic Sulfides						
Carbonyl sulfide	0.01	0.01	0.06	0.01	0.01	0.00
Methyl sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Ethyl sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.03	0.00	0.00	0.00	0.00	0.01
Monoethylamine & dimethylamine	0.00	0.00	0.01	0.00	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	24.04	6.15	8.30	5.54	27.73	7.28	11.57	7.11	19.92	5.25	8.40	5.49
Ethylene	31.68	14.53	18.75	13.36	35.18	17.09	26.00	17.07	30.97	15.96	24.02	15.80
Ethane	2.76	1.34	1.65	1.24	3.01	1.52	2.27	1.51	2.71	1.37	1.95	1.37
Acetylene	34.50	8.30	11.10	7.50	36.89	8.21	14.24	8.27	37.60	10.17	15.46	10.14
Propane	0.56	0.41	0.39	0.30	0.37	0.22	0.27	0.20	0.28	0.18	0.28	0.20
Propylene	13.23	6.15	8.09	5.66	16.78	8.88	14.02	8.91	15.44	8.41	13.28	8.21
Benzene	11.37	5.49	6.82	4.90	15.99	15.82	15.67	6.69	21.90	17.51	10.52	9.22
Toluene	38.26	15.07	22.12	14.07	190.96	122.62	158.35	108.24	184.28	131.62	128.46	105.02
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.05	0.02	0.03	0.02	0.04	0.02	0.03	0.02

TABLE C-6. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 723 - Lean Idle

	Emissions in mg/km					
	Unmodified		Malfunction			
	723-11		723-21		723-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	89.48	60.98	96.92	61.83	93.38	72.99
Sulfates	0.67	0.61	0.69	0.41	0.51	0.48
Ammonia	2.63	1.88	0.00	0.00	3.68	3.63
Cyanides & Cyanogen	7.94	5.66	5.66	4.14	5.75	4.45
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	7.04	14.59	24.09	40.60	36.23	38.50
Acetaldehyde	7.10	6.73	7.64	9.07	7.02	6.38
Acetone	0.00	0.00	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.26	0.00
Organic Sulfides						
Carbonyl sulfide	--	--	0.04	0.02	0.03	0.01
Methyl sulfide	--	--	0.00	0.00	0.03	0.01
Ethyl sulfide	--	--	0.00	0.00	0.00	0.00
Methyl disulfide	--	--	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.07	0.00	0.10	0.10	0.09	0.02
Monoethylamine & dimethylamine	0.06	0.00	0.03	0.02	0.01	0.00
Trimethylamine	0.04	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	24.47	3.91	7.03	3.31	17.10	2.77	6.14	2.78	20.84	3.13	6.51	2.83
Ethylene	30.77	11.55	16.80	10.61	28.72	16.45	20.93	16.83	28.88	15.76	21.24	16.03
Ethane	2.67	1.09	1.44	0.98	2.54	1.40	1.76	1.43	2.60	1.39	1.86	1.34
Acetylene	36.40	5.55	9.01	4.88	20.45	3.45	7.02	3.35	24.96	3.38	6.99	3.39
Propane	0.23	0.11	0.17	0.10	0.30	0.19	0.22	0.00	0.33	0.20	0.29	0.19
Propylene	12.47	5.19	7.31	4.75	13.09	8.90	10.77	9.10	12.68	8.19	10.58	8.45
Benzene	10.23	4.43	6.81	3.49	9.06	4.62	6.63	4.71	8.98	4.21	8.90	6.14
Toluene	33.77	15.24	22.78	13.16	39.28	36.76	51.82	37.54	38.84	33.73	55.53	38.28
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-7. FTP INDIVIDUAL SAMPLE EMISSION RESULTS
Test Series 731 - Rich Idle

	Emissions in mg/km					
	Unmodified		Malfunction			
	731-11		731-31		731-41	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	147.17	91.75	141.65	83.17	148.92	87.60
Sulfates	2.43	1.23	1.98	0.34	0.17	0.26
Ammonia	9.89	4.79	4.96	1.44	2.13	2.14
Cyanides & Cyanogen	3.15	3.67	5.65	6.28	7.27	2.52
Hydrogen Sulfide	0.20	0.00	0.00	0.00	0.23	0.00
Aldehydes & Ketones						
Formaldehyde	68.14	89.04	53.95	53.48	44.45	31.13
Acetaldehyde	7.73	10.62	6.81	6.86	4.24	5.72
Acetone	0.00	0.00	0.62	0.62	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	1.12
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Organic Sulfides						
Carbonyl sulfide	0.00	0.59	0.05	0.06	0.04	0.05
Methyl sulfide	0.00	0.08	0.02	0.05	0.12	0.19
Ethyl sulfide	0.00	0.00	0.00	0.00	0.00	0.02
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.01
Organic Amines						
Monomethylamine	0.10	0.03	0.02	0.05	0.38	0.26
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	22.13	2.62	5.53	2.48	31.52	11.68	13.73	10.78	36.01	13.86	13.39	12.51
Ethylene	39.32	15.96	27.50	15.91	44.37	22.56	32.60	21.70	44.46	23.29	31.42	22.55
Ethane	3.14	1.22	2.00	1.08	3.69	1.82	2.69	1.79	3.82	1.95	2.72	1.84
Acetylene	29.00	4.72	10.16	4.28	36.89	12.05	18.23	11.19	42.80	13.36	16.92	12.03
Propane	0.28	0.00	4.43	0.00	0.35	0.22	0.28	0.21	0.31	0.18	0.18	0.14
Propylene	16.86	7.98	12.72	8.07	18.30	9.64	14.26	9.25	18.08	10.00	13.71	9.66
Benzene	12.12	4.22	6.71	3.92	14.74	7.72	9.54	7.36	15.08	8.59	9.47	8.01
Toluene	42.59	16.59	22.90	15.17	55.31	29.56	33.53	27.69	49.79	28.08	31.58	26.53
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	--	--	--	--	--	--	--	--	0.00	0.00	0.00	0.00
Tetraethyllead	--	--	--	--	--	--	--	--	--	--	--	--
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-8. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 732 - 12 Percent Misfire

	Emissions in mg/km					
	Unmodified		Malfunction			
	732-11		732-21		732-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	132.53	96.94	306.54	133.73	322.34	171.82
Sulfates	0.69	0.60	3.22	1.98	3.93	1.40
Ammonia	5.33	3.63	5.03	6.06	3.93	3.71
Cyanides & Cyanogen	2.87	3.08	1.80	1.76	1.42	1.96
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	30.65	30.80	154.27	202.12	136.05	203.31
Acetaldehyde	4.61	5.08	39.50	33.13	33.51	32.10
Acetone	1.47	0.31	11.06	5.78	14.56	13.64
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	3.49	3.26	3.96
Hexanaldehyde	0.00	0.00	0.90	2.58	2.61	2.29
Organic Sulfides						
Carbonyl sulfide	0.02	0.02	0.01	0.01	0.02	0.01
Methyl sulfide	0.02	0.04	0.00	0.04	0.17	0.07
Ethyl sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.03	0.05	0.17	0.19	0.09	0.13
Monoethylamine & dimethylamine	0.02	0.03	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.01	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions [illegible]m				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	16.68	2.76	4.55	4.84	21.46	4.22	7.19	4.07	22.95	3.94	6.80	3.33
Ethylene	28.95	12.80	18.55	13.65	65.76	27.89	46.22	27.16	62.70	28.23	45.86	26.50
Ethane	2.18	0.97	1.37	1.02	5.43	2.14	3.44	2.02	5.14	2.10	3.41	1.87
Acetylene	19.03	5.16	8.35	7.45	25.96	6.15	10.96	5.69	29.07	5.97	10.77	5.24
Propane	0.30	0.07	0.00	0.00	0.64	0.32	0.42	0.23	0.37	0.05	0.14	0.02
Propylene	12.30	5.79	8.12	6.17	29.13	19.03	30.83	18.53	37.96	19.31	30.17	18.24
Benzene	9.28	3.86	5.90	4.07	23.66	13.05	17.15	11.67	24.54	21.13	16.46	43.18
Toluene	33.20	16.27	25.71	17.52	267.30	176.92	224.13	177.22	311.63	191.60	234.63	208.24
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.09	0.07	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.09	0.03	0.04	0.05	0.05	0.03	0.04	0.03

TABLE C-9. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 733 - Rich Idle Without Vacuum Advance

	Emissions in mg/km			
	Unmodified 733-11		Malfunction 731-21	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	161.56	76.93	33.86	106.77
Sulfates	0.25	0.62	0.00	0.37
Ammonia	4.33	4.54	3.70	3.23
Cyanides & Cyanogen	3.35	4.06	3.66	3.87
Hydrogen Sulfide	0.00	0.00	0.00	0.00
Aldehydes & Ketones				
Formaldehyde	49.64	56.37	225.75	30.31
Acetaldehyde	4.50	3.78	18.22	3.38
Acetone	0.00	0.00	0.00	0.00
Isobutyraldehyde	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00
Organic Sulfides				
Carbonyl sulfide	0.01	0.01	0.14	0.10
Methyl sulfide	0.03	0.03	0.02	0.07
Ethyl sulfide	0.01	0.01	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4
Individual Hydrocarbons								
Methane	33.08	3.03	4.82	2.50	32.31	11.16	11.59	11.19
Ethylene	41.90	15.92	24.19	11.91	37.03	19.96	24.50	19.30
Ethane	3.52	1.33	1.90	1.19	2.89	1.60	1.94	1.62
Acetylene	35.95	5.10	8.55	4.19	37.62	12.60	16.52	11.93
Propane	0.35	0.12	0.16	0.11	0.22	0.11	0.09	0.10
Propylene	17.03	7.85	11.28	7.53	14.27	7.66	9.31	7.54
Benzene	14.04	4.80	6.33	3.95	12.55	7.49	8.38	7.45
Toluene	47.79	17.77	22.24	17.88	36.71	20.36	22.49	19.93
Lead Components								
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	--	--	--	--	--	--	--	--
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-10. FTP INDIVIDUAL SAMPLE EMISSIONS RESULTS
Test Series 741 - Rich Idle

	Emissions in mg/km					
	Unmodified		Malfunction			
	741-11		741-21		741-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	125.75	114.58	119.64	114.70	120.44	96.39
Sulfates	0.31	0.29	0.55	0.40	0.44	0.42
Ammonia	3.41	2.50	1.38	2.60	6.75	7.80
Cyanides & Cyanogen	0.86	0.55	1.61	0.30	3.73	3.28
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	8.62	40.61	19.53	25.63	15.36	18.60
Acetaldehyde	1.12	3.11	2.16	5.02	1.38	1.28
Acetone	0.00	0.00	0.00	0.00	0.26	0.00
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Organic Sulfides						
Carbonyl sulfide	0.00	0.00	0.14	0.13	0.63	0.00
Methyl sulfide	0.00	0.00	0.01	0.00	0.00	0.00
Ethyl sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Methyl disulfide	0.00	0.00	0.00	0.00	0.00	0.00
Organic Amines						
Monomethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Monoethylamine & dimethylamine	0.00	0.00	0.02	0.02	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	21.96	3.26	--	2.83	44.81	33.49	27.66	23.31	46.04	36.25	27.71	22.06
Ethylene	43.41	20.08	--	20.82	51.43	31.29	42.94	29.17	51.13	32.68	16.22	30.88
Ethane	4.03	1.68	--	1.55	4.53	2.54	3.68	2.36	4.31	2.46	3.76	2.42
Acetylene	23.50	5.10	--	4.70	57.90	39.10	36.60	25.00	59.40	41.10	39.12	25.32
Propane	0.44	0.21	--	0.47	0.40	0.27	0.34	0.24	0.41	0.28	0.37	0.27
Propylene	21.48	11.37	--	11.53	22.08	13.15	19.38	12.87	21.57	13.51	21.03	12.92
Benzene	11.31	24.87	--	3.63	13.19	8.36	10.17	10.18	13.70	9.41	10.84	7.81
Toluene	49.60	21.15	--	17.67	51.53	30.52	37.50	29.32	57.71	35.25	41.12	29.99
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE C-11. FTP INDIVIDUAL SAMPLE EMISSION RESULTS
Test Series 742 - 12 Percent Misfire and 10° Retard

	Emissions in mg/km					
	Unmodified		Malfunction			
	744-11		742-21		742-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	91.70	80.84	207.31	169.90	180.98	166.17
Sulfates	0.15	0.24	0.39	0.90	1.02	1.30
Ammonia	4.36	3.36	29.86	3.48	25.63	6.53
Cyanides & Cyanogen	0.88	0.99	0.36	0.62	0.36	0.24
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	27.91	10.67	38.59	125.23	--	--
Acetaldehyde	1.42	0.31	0.44	3.95	--	--
Acetone	0.61	0.00	0.33	0.00	--	--
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00	--	--
Hexanaldehyde	0.00	0.00	4.01	0.00	--	--
Organic Sulfides						
Carbonyl sulfide	0.00	0.00	--	--	0.14	0.00
Methyl sulfide	0.00	0.00	--	--	0.00	0.00
Ethyl sulfide	0.00	0.00	--	--	0.00	0.00
Methyl disulfide	0.00	0.00	--	--	0.00	0.00
Organic Amines						
Monomethylamine	0.02	0.01	0.00	0.04	0.00	0.00
Monoethylamine & dimethylamine	0.01	0.00	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	17.00	4.16	6.70	3.25	24.58	4.53	11.60	5.02	27.73	4.57	10.88	3.67
Ethylene	38.60	18.69	30.59	18.51	53.54	28.23	49.82	29.42	57.09	26.59	50.96	27.76
Ethane	3.69	1.69	2.52	1.52	4.54	2.13	4.03	2.14	4.95	2.21	4.03	2.04
Acetylene	18.50	5.40	10.10	4.60	26.80	6.10	14.40	6.60	31.70	7.20	15.10	6.10
Propane	0.42	0.25	0.28	0.21	0.42	0.20	0.40	0.22	0.50	0.30	0.65	0.46
Propylene	19.21	10.23	16.05	10.17	32.30	20.35	33.68	21.00	35.62	20.39	36.78	21.94
Benzene	9.54	4.29	6.86	4.07	23.74	12.57	25.78	19.96	35.97	12.06	27.89	12.64
Toluene	40.52	19.16	30.15	17.48	296.92	184.49	262.59	211.95	440.34	247.08	360.29	251.73
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.04	0.02	0.03	0.04	0.08	0.04	0.07	0.10

TABLE C-12.FTP INDIVIDUAL SAMPLE EMISSION RESULTS
Test Series 743 - Lean Idle

	Emissions in mg/km					
	Unmodified		Malfunction			
	743-11		743-21		743-31	
	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS	COLD-UDDS	HOT-UDDS
Total Particulate	87.48	77.55	92.42	84.39	97.82	91.55
Sulfates	0.29	0.34	0.62	0.52	0.48	0.40
Ammonia	7.86	7.52	2.35	2.58	4.36	4.72
Cyanides & Cyanogen	1.20	0.90	1.60	2.00	2.20	2.20
Hydrogen Sulfide	0.00	0.00	0.00	0.00	0.00	0.00
Aldehydes & Ketones						
Formaldehyde	32.36	8.90	8.46	9.48	3.92	--
Acetaldehyde	2.82	0.00	0.56	0.41	2.11	3.12
Acetone	0.44	0.00	0.00	0.15	0.00	0.00
Isobutyraldehyde	--	--	--	--	--	--
Methyl ethyl ketone	0.00	0.00	0.00	0.00	0.00	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00	0.00	0.00
Organic Sulfides						
Carbonyl sulfide	--	--	--	--	0.17	0.04
Methyl sulfide	--	--	--	--	0.00	0.00
Ethyl sulfide	--	--	--	--	0.00	0.00
Methyl disulfide	--	--	--	--	0.00	0.00
Organic Amines						
Monomethylamine	0.08	0.06	0.04	0.03	0.04	0.03
Monoethylamine & dimethylamine	0.00	0.06	0.01	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00	0.00	0.00

	Emissions in ppm				Emissions in ppm				Emissions in ppm			
	COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS		COLD-UDDS		HOT-UDDS	
	1	2	3	4	1	2	3	4	1	2	3	4
Individual Hydrocarbons												
Methane	16.43	3.73	6.90	3.60	14.69	3.20	6.63	3.09	13.94	2.95	7.13	3.00
Ethylene	38.69	18.66	32.92	19.10	41.45	23.90	36.86	25.04	40.09	23.50	36.97	23.91
Ethane	3.63	1.61	2.87	1.55	3.66	1.65	2.81	1.75	3.58	1.68	2.93	1.69
Acetylene	18.50	5.20	10.70	5.00	16.10	3.80	9.50	3.90	14.10	2.90	8.90	2.90
Propane	0.34	0.13	0.26	0.19	0.34	0.21	0.32	0.20	0.39	0.18	0.26	0.19
Propylene	19.33	10.32	17.83	10.65	21.41	13.64	20.31	14.45	20.80	13.52	20.49	13.82
Benzene	11.30	4.38	7.16	3.73	10.42	4.72	8.06	4.33	10.27	5.19	8.22	5.42
Toluene	49.83	19.05	32.05	14.88	48.82	26.26	46.61	30.52	48.45	31.90	55.16	35.28
Lead Components												
Tetramethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

APPENDIX D

COMPUTER PRINTOUTS OF THE REGULATED EMISSIONS TESTS RESULTS

TABLE D-1. TEST 711 EMISSIONS RESULTS

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                                FTP    VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                         PROJECT 11-5830-004

TEST NO.    711-11   RUN                    VEHICLE NO.71                  TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS. DELTA 88           DATE    12/15/80               ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                  BAG CART NO.  1                GASOLINE  EM-433-F
TRANSMISSION A3                             DYNO NO.      3                ODOMETER ###### KM(80141. MILES)
                                            CVS NO.   2

BAROMETER 743.71 MM HG(29.28 IN HG)         DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  52. PCT                  ABS. HUMIDITY 10.1 GM/KG       NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
   BAG NUMBER                                    1                  2                  3                  4
   DESCRIPTION                           COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)          762.0 (30.0)       774.7 (30.5)       762.0 (30.0)       774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)        762.0 (30.0)       774.7 (30.5)       762.0 (30.0)       774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)       43.3 (110.0)       43.3 (110.0)       43.3 (110.0)
   BLOWER REVOLUTIONS                        40613.             69597.             40540.             69568.
   TOT FLOW STD. CU. METRES(SCF)           76.4 ( 2697.)     130.7 ( 4613.)      76.2 ( 2692.)     130.6 ( 4611.)
   HC  SAMPLE METER/RANGE/PPM             42.0/ 3/ 420.      10.3/ 3/ 103.      19.8/ 3/ 198.       9.3/ 3/  93.
   HC  BCKGRD METER/RANGE/PPM              1.4/ 3/  14.       1.2/ 3/  12.       1.3/ 3/  13.       1.2/ 3/  12.
   CO  SAMPLE METER/RANGE/PPM             72.7/ 2/4002.      86.3/11/ 411.      27.5/ 3/ 640.      80.1/11/ 363.
   CO  BCKGRD METER/RANGE/PPM               .1/ 2/   4.       1.8/11/   5.        .2/ 3/   5.       1.2/11/   3.
   CO2 SAMPLE METER/RANGE/PCT             42.8/ 2/ 1.86      72.5/ 3/ 1.32      89.2/ 3/ 1.66      71.2/ 3/ 1.29
   CO2 BCKGRD METER/RANGE/PCT              1.7/ 2/  .06       3.5/ 3/  .05       3.3/ 3/  .05       3.8/ 3/  .06
   NOX SAMPLE METER/RANGE/PPM             39.4/ 3/ 118.      43.3/ 2/  43.      38.9/ 3/ 117.      42.2/ 2/  42.
   NOX BCKGRD METER/RANGE/PPM               .1/ 3/   0.        .8/ 2/   1.        .1/ 3/   0.        .5/ 2/   1.
   DILUTION FACTOR                            5.88               9.82               7.69              10.05
   HC  CONCENTRATION PPM                     408.                92.               187.                82.
   CO  CONCENTRATION PPM                    3788.               389.               605.               345.
   CO2 CONCENTRATION PCT                     1.81               1.27               1.62               1.24
   NOX CONCENTRATION PPM                    118.0               42.6              116.4               41.7
   HC  MASS GRAMS                           17.99               6.95               8.21               6.19
   CO  MASS GRAMS                          336.89              59.14              53.69              52.44
   CO2 MASS GRAMS                          2527.3             3030.8             2257.9             2935.7
   NOX MASS GRAMS                           16.91              10.44              16.66              10.23

   HC  GRAMS/KM                              3.08               1.11               1.43               1.00
   CO  GRAMS/KM                             57.45               9.48               9.35               8.51
   CO2 GRAMS/KM                             432.5              485.7              393.1              479.7
   NOX GRAMS/KM                              2.89               1.67               2.90               1.66
   FUEL CONSUMPTION BY CB L/100KM           22.74              21.52              17.60              21.18

   RUN TIME             SECONDS             506.               868.               505.               868.
   MEASURED DISTANCE    KM                  5.84               6.24               5.74               6.16
        DFC, WET (DRY)                               .873 ( .858)                          .889 ( .874)
        SCF, WET (DRY)                              1.000 ( .969)                         1.000 ( .970)
        VOL (SCM)                                          207.0                                 206.8
        SAM BLR (SCM)                                       0.00                                  0.00
        KM  (MEASURED)                                     12.08                                 11.91
        FUEL CONSUMPTION L/100KM                           22.11                                 19.45

COMPOSITE RESULTS                                                                        3-BAG      (4-BAG)
   TEST NUMBER           711-11                      CARBON DIOXIDE        G/KM         449.3      ( 447.4)
   BAROMETER     MM HG  743.7                        FUEL CONSUMPTION      L/100KM      20.70      ( 20.60)
   HUMIDITY      G/KG    10.1                        HYDROCARBONS (THC)    G/KM          1.61      (  1.58)
   TEMPERATURE   DEG C   24.4                        CARBON MONOXIDE       G/KM         19.46      ( 19.17)
                                                     OXIDES OF NITROGEN    G/KM          2.26      (  2.26)
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                                SET    VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                         PROJECT 11-5830-004

TEST NO.    711-12   RUN                    VEHICLE NO.71                  TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS. DELTA 88           DATE    12/15/80               ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                  BAG CART NO.  1                GASOLINE  EM-433-F
TRANSMISSION A3                             DYNO NO.      3                ODOMETER ###### KM(80141. MILES)
                                            CVS NO.   2

BAROMETER 743.20 MM HG(29.26 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  49. PCT                  ABS. HUMIDITY  9.9 GM/KG       NOX HUMIDITY CORRECTION FACTOR   .97
BAG RESULTS
   TEST CYCLE                                  SET                     HFET

   BLOWER DIF P MM. H2O(IN. H2O)          774.7 (30.5)            774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)        774.7 (30.5)            774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)            43.3 (110.0)
   BLOWER REVOLUTIONS                       111919.                  61349.
   TOT FLOW STD. CU. METRES(SCF)          209.9 ( 7413.)          115.0 ( 4060.)
   HC  SAMPLE METER/RANGE/PPM             18.0/ 3/ 180.           26.1/ 3/ 261.
   HC  BCKGRD METER/RANGE/PPM              1.0/ 3/  10.            1.1/ 3/  11.
   CO  SAMPLE METER/RANGE/PPM             27.7/ 3/ 645.           35.1/ 3/ 829.
   CO  BCKGRD METER/RANGE/PPM               .1/ 3/   2.             .1/ 3/   2.
   CO2 SAMPLE METER/RANGE/PCT             98.5/ 3/ 1.86           50.1/ 2/ 2.24
   CO2 BCKGRD METER/RANGE/PCT              3.3/ 3/  .05            1.3/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM             55.5/ 3/ 167.           84.4/ 3/ 253.
   NOX BCKGRD METER/RANGE/PPM               .1/ 3/   0.             .2/ 3/   1.
   DILUTION FACTOR                            6.92                    5.71
   HC  CONCENTRATION PPM                     171.                    252.
   CO  CONCENTRATION PPM                     610.                    778.
   CO2 CONCENTRATION PCT                     1.81                    2.21
   NOX CONCENTRATION PPM                    166.2                   252.7
   HC  MASS GRAMS                           20.75                   16.70
   CO  MASS GRAMS                          148.99                  104.13
   CO2 MASS GRAMS                          6970.9                  4645.7
   NOX MASS GRAMS                           65.00                   54.14
   RUN TIME             SECONDS             1397.                    766.
        DFC, WET (DRY)                    .856 ( .842)            .825 ( .812)
        SCF, WET (DRY)                   1.000 ( .967)           1.000 ( .963)
        VOL (SCM)                            209.9                   115.0
        SAM BLR (SCM)                         0.00                    0.00
        KM  (MEASURED)                       21.63                   16.53

   TEST NUMBER,                             711-12                  711-13
   BAROMETER,           MM HG                743.2                   742.7
   HUMIDITY,            G/KG                   9.9                     9.9
   TEMPERATURE,         DEG C                 25.0                    25.0
    CARBON DIOXIDE,      G/KM                322.3                   281.0
   FUEL CONSUMPTION,    L/100KM              14.35                   12.55

   HYDROCARBONS,        G/KM                   .96                    1.01
   CARBON MONOXIDE,     G/KM                  6.89                    6.30
   OXIDES OF NITROGEN,  G/KM                  3.01                    3.27
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TABLE D-2. TEST 711 EMISSIONS RESULTS

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                                            FTP   VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                                                   PROJECT 11-5830-004

TEST NO.   711-21   RUN                          VEHICLE NO.71                          TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS. DELTA 88                DATE   12/16/80                        ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                       BAG CART NO.  1                        GASOLINE  EM-433-F
TRANSMISSION A3                                  DYNO NO.      3                        ODOMETER ****** KM(80141. MILES)
                                                 CVS NO.   2

BAROMETER 743.97 MM HG(29.29 IN HG)              DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  31. PCT                       ABS. HUMIDITY  6.7 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .88
BAG RESULTS
   BAG NUMBER                                          1                  2                  3                  4
   DESCRIPTION                                   COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)                 762.0 (30.0)       774.7 (30.5)       762.0 (30.0)       774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)               762.0 (30.0)       774.7 (30.5)       762.0 (30.0)       774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)              43.3 (110.0)       43.3 (110.0)       42.8 (109.0)       43.3 (110.0)
   BLOWER REVOLUTIONS                              40660.             69540.             40544.             69567.
   TOT FLOW STD. CU. METRES(SCF)                 76.5 ( 2701.)     130.6 ( 4612.)      76.4 ( 2696.)     130.6 ( 4613.)
   HC  SAMPLE METER/RANGE/PPM                    40.6/ 3/ 406.      15.4/ 3/ 154.      19.7/ 3/ 197.      14.4/ 3/ 144.
   HC  BCKGRD METER/RANGE/PPM                     1.1/ 3/  11.       1.2/ 3/  12.       1.2/ 3/  12.       1.3/ 3/  13.
   CO  SAMPLE METER/RANGE/PPM                    76.1/ 2/4281.      64.9/ 3/1640.      54.6/ 3/1353.      58.3/ 3/1460.
   CO  BCKGRD METER/RANGE/PPM                      .1/ 2/   4.        .5/ 3/  11.        .4/ 3/   9.        .5/ 3/  11.
   CO2 SAMPLE METER/RANGE/PCT                    94.6/ 3/ 1.77      67.0/ 3/ 1.20      84.9/ 3/ 1.57      67.8/ 3/ 1.22
   CO2 BCKGRD METER/RANGE/PCT                     3.0/ 3/  .05       3.4/ 3/  .05       3.8/ 3/  .06       3.9/ 3/  .06
   NOX SAMPLE METER/RANGE/PPM                    41.8/ 3/ 125.      44.1/ 2/  44.      44.1/ 3/ 132.      45.2/ 2/  45.
   NOX BCKGRD METER/RANGE/PPM                      .1/ 3/   0.       1.2/ 2/   1.        .1/ 3/   0.        .6/ 2/   1.
   DILUTION FACTOR                                   6.02               9.72               7.79               9.75
   HC  CONCENTRATION PPM                            397.               143.               187.               132.
   CO  CONCENTRATION PPM                           4088.              1595.              1290.              1401.
   CO2 CONCENTRATION PCT                             1.74               1.16               1.52               1.17
   NOX CONCENTRATION PPM                           125.1               43.0              132.0               44.7
   HC  MASS GRAMS                                   17.51              10.79               8.21               9.97
   CO  MASS GRAMS                                  364.13             242.45             114.70             213.11
   CO2 MASS GRAMS                                 2432.3             2765.5             2126.0             2788.5
   NOX MASS GRAMS                                   14.19               9.50              17.05               9.87

   HC  GRAMS/KM                                      3.01               1.74               1.42               1.61
   CO  GRAMS/KM                                     62.53              39.12              19.79              34.46
   CO2 GRAMS/KM                                    417.7              446.3              366.7              450.9
   NOX GRAMS/KM                                      2.78               1.53               2.94               1.60
   FUEL CONSUMPTION BY CB L/100KM                   22.43              21.91              17.17              21.77

   RUN TIME               SECONDS                  506.               866.               505.               867.
   MEASURED DISTANCE      KM                         5.82               6.20               5.80               6.18
        DFC, WET (DRY)                                    .874 ( .865)                          .888 ( .879)
        SCF, WET (DRY)                                   1.000 ( .977)                         1.000 ( .977)
        VOL (SCM)                                               207.1                                 207.0
        SAM BLR (SCM)                                             0.00                                  0.00
        KM  (MEASURED)                                           12.02                                 11.98
        FUEL CONSUMPTION L/100KM                                 22.16                                 19.55

                                                                                              3-BAG       (4-BAG)
COMPOSITE RESULTS                                               CARBON DIOXIDE       G/KM      418.4      ( 419.7)
   TEST NUMBER           711-21                                 FUEL CONSUMPTION     L/100KM   20.71      ( 20.67)
   BAROMETER     MM HG   744.0                                  HYDROCARBONS (THC)   G/KM       1.91      (  1.88)
   HUMIDITY      G/KG      6.7                                  CARBON MONOXIDE      G/KM      38.67      ( 37.29)
   TEMPERATURE   DEG C    26.1                                  OXIDES OF NITROGEN   G/KM       2.18      (  2.20)
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                                            SET   VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                                                   PROJECT 11-5830-004

TEST NO.   711-22   RUN                          VEHICLE NO.71                          TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS. DELTA 88                DATE   12/16/80                        ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                       BAG CART NO.  1                        GASOLINE  EM-433-F
TRANSMISSION A3                                  DYNO NO.      3                        ODOMETER ****** KM(80141. MILES)
                                                 CVS NO.   2

BAROMETER 743.46 MM HG(29.27 IN HG)              DRY BULB TEMP. 28.3 DEG C(83.0 DEG F)
RELATIVE HUMIDITY  24. PCT                       ABS. HUMIDITY  5.8 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .86
BAG RESULTS
   TEST CYCLE                                         SET                    HFET

   BLOWER DIF P MM. H2O(IN. H2O)                 774.7 (30.5)           787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)               774.7 (30.5)           787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)              43.3 (110.0)           43.3 (110.0)
   BLOWER REVOLUTIONS                             111874.                 61372.
   TOT FLOW STD. CU. METRES(SCF)                 209.9 ( 7413.)         115.0 ( 4059.)
   HC  SAMPLE METER/RANGE/PPM                    19.0/ 3/ 190.          23.4/ 3/ 234.
   HC  BCKGRD METER/RANGE/PPM                     1.0/ 3/  10.           1.0/ 3/  10.
   CO  SAMPLE METER/RANGE/PPM                    50.7/ 3/1243.          40.7/ 3/ 973.
   CO  BCKGRD METER/RANGE/PPM                      .1/ 3/   2.            .1/ 3/   2.
   CO2 SAMPLE METER/RANGE/PCT                    95.6/ 3/ 1.80          49.2/ 2/ 2.20
   CO2 BCKGRD METER/RANGE/PCT                     2.7/ 3/  .04           1.3/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM                    62.5/ 3/ 188.          93.7/ 3/ 281.
   NOX BCKGRD METER/RANGE/PPM                      .2/ 3/   1.            .3/ 3/   1.
   DILUTION FACTOR                                   6.93                   5.80
   HC  CONCENTRATION PPM                            181.                   226.
   CO  CONCENTRATION PPM                           1188.                   923.
   CO2 CONCENTRATION PCT                             1.76                   2.16
   NOX CONCENTRATION PPM                           187.0                  280.4
   HC  MASS GRAMS                                   21.96                  14.96
   CO  MASS GRAMS                                  290.37                 123.49
   CO2 MASS GRAMS                                 6766.6                 4540.9
   NOX MASS GRAMS                                   64.62                  52.70
   RUN TIME               SECONDS                  1396.                   766.
        DFC, WET (DRY)                            .856 ( .849)           .820 ( .822)
        SCF, WET (DRY)                           1.000 ( .976)          1.000 ( .973)
        VOL (SCM)                                  209.9                  115.0
        SAM BLR (SCM)                                0.00                   0.00
        KM  (MEASURED)                              21.59                  16.37

   TEST NUMBER,                                    711-22                 711-23
   BAROMETER,            MM HG                     743.5                  743.5
   HUMIDITY,             G/KG                        5.8                    5.6
   TEMPERATURE,          DEG C                      28.3                   28.9
    CARBON DIOXIDE,       G/KM                     313.4                  277.4
   FUEL CONSUMPTION,     L/100KM                    14.41                  12.47

   HYDROCARBONS,         G/KM                        1.02                    .91
   CARBON MONOXIDE,      G/KM                       13.45                   7.54
   OXIDES OF NITROGEN,   G/KM                        2.99                   3.22
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TABLE D-3. TEST 711 EMISSIONS RESULTS

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                                      FTP    VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                                              PROJECT 11-5830-004

TEST NO.   711-31   RUN   1                    VEHICLE NO.71                          TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS. DELTA 88              DATE   12/17/80                        ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                     BAG CART NO.  1                        GASOLINE  EM-433-F
TRANSMISSION A3                                DYNO NO.      3                        ODOMETER ****** KM(80141. MILES)
                                               CVS NO.   2

BAROMETER 746.00 MM HG(29.37 IN HG)            DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  34. PCT                     ABS. HUMIDITY  6.9 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .89
BAG RESULTS
   BAG NUMBER                                        1                  2                   3                  4
   DESCRIPTION                                COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)              767.1 (30.2)       767.1 (30.2)        762.0 (30.0)       769.6 (30.3)
   BLOWER INLET P MM. H2O(IN. H2O)            762.0 (30.0)       762.0 (30.0)        756.9 (29.8)       762.0 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)           44.4 (112.0)       43.9 (111.0)        43.9 (111.0)       43.9 (111.0)
   BLOWER REVOLUTIONS                           40598.             69634.              40560.             69500.
   TOT FLOW STD. CU. METRES(SCF)               76.5 ( 2700.)     131.3 ( 4635.)       76.5 ( 2702.)     131.0 ( 4625.)
   HC  SAMPLE METER/RANGE/PPM                 39.8/ 3/ 398.      16.4/ 3/ 164.       20.4/ 3/ 204.      15.4/ 3/ 154.
   HC  BCKGRD METER/RANGE/PPM                  1.1/ 3/  11.       1.2/ 3/  12.        1.4/ 3/  14.       1.4/ 3/  14.
   CO  SAMPLE METER/RANGE/PPM                 76.0/ 2/4273.      69.6/ 3/1809.       59.3/ 3/1490.      64.7/ 3/1654.
   CO  BCKGRD METER/RANGE/PPM                   .1/ 2/   4.        .1/ 3/   2.         .1/ 3/   2.        .1/ 3/   2.
   CO2 SAMPLE METER/RANGE/PCT                 92.2/ 3/ 1.72      65.9/ 3/ 1.18       85.6/ 3/ 1.59      65.6/ 3/ 1.18
   CO2 BCKGRD METER/RANGE/PCT                  3.0/ 3/  .05       3.0/ 3/  .05        3.0/ 3/  .05       3.0/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM                 39.2/ 3/ 118.      43.7/ 2/  44.       44.8/ 3/ 134.      44.7/ 2/  45.
   NOX BCKGRD METER/RANGE/PPM                   .3/ 3/   1.        .8/ 2/   1.         .3/ 3/   1.        .8/ 2/   1.
   DILUTION FACTOR                                6.17               9.76                7.66               9.92
   HC  CONCENTRATION PPM                         389.               153.                192.               141.
   CO  CONCENTRATION PPM                         4082.              1746.               1426.              1596.
   CO2 CONCENTRATION PCT                         1.69               1.14                1.55               1.13
   NOX CONCENTRATION PPM                         116.8              43.0                133.6              44.0
   HC  MASS GRAMS                                17.14              11.60               8.46               10.68
   CO  MASS GRAMS                               363.30           - 266.80              127.04             243.44
   CO2 MASS GRAMS                               2360.0             2739.3              2166.0             2719.0
   NOX MASS GRAMS                                15.20              9.60                17.39              9.80

   HC  GRAMS/KM                                  2.97               1.87                1.46               1.72
   CO  GRAMS/KM                                 62.87              43.00               21.97              39.11
   CO2 GRAMS/KM                                 408.4              441.5               374.6              436.8
   NOX GRAMS/KM                                  2.63               1.55                3.01               1.57
   FUEL CONSUMPTION BY CB L/100KM               22.05              21.98               17.66              21.50

   RUN TIME              SECONDS                506.               868.                506.               867.
   MEASURED DISTANCE     KM                     5.78               6.21                5.78               6.22
        DFC, WET (DRY)                                  .876 ( .866)                           .880 ( .879)
        SCF, WET (DRY)                                 1.000 ( .976)                          1.000 ( .977)
        VOL (SCM)                                            207.7                                  207.5
        SAM BLR (SCM)                                         0.00                                   0.00
        KM  (MEASURED)                                       11.98                                  12.01
        FUEL CONSUMPTION L/100KM                             22.01                                  19.65

COMPOSITE RESULTS                                                                                 3-BAG       (4-BAG)
   TEST NUMBER          711-31                                       CARBON DIOXIDE      G/KM     416.2      ( 414.9)
   BAROMETER     MM HG  746.0                                        FUEL CONSUMPTION    L/100KM  20.81      ( 20.67)
   HUMIDITY      G/KG     6.9                                        HYDROCARBONS (THC)  G/KM      1.99      (  1.94)
   TEMPERATURE   DEG C   25.6                                        CARBON MONOXIDE     G/KM     41.34      ( 40.20)
                                                                     OXIDES OF NITROGEN  G/KM      2.17      (  2.18)


                                      SET    VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                                              PROJECT 11-5830-004

TEST NO.   711-32   RUN   1                    VEHICLE NO.71                          TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS. DELTA 88              DATE   12/17/80                        ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                     BAG CART NO.  1                        GASOLINE  EM-433-F
TRANSMISSION A3                                DYNO NO.      3                        ODOMETER ****** KM(****** MILES)
                                               CVS NO.   2

BAROMETER 745.49 MM HG(29.35 IN HG)            DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  35. PCT                     ABS. HUMIDITY  6.8 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .89
BAG RESULTS
   TEST CYCLE                                      SET                    HFET

   BLOWER DIF P MM. H2O(IN. H2O)              762.0 (30.0)           787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)            756.9 (29.8)           774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)           43.3 (110.0)           43.9 (111.0)
   BLOWER REVOLUTIONS                          111918.                 61326.
   TOT FLOW STD. CU. METRES(SCF)              211.2 ( 7456.)         115.2 ( 4068.)
   HC  SAMPLE METER/RANGE/PPM                 20.5/ 3/ 205.          25.1/ 3/ 251.
   HC  BCKGRD METER/RANGE/PPM                  1.5/ 3/  15.           1.5/ 3/  15.
   CO  SAMPLE METER/RANGE/PPM                 55.8/ 3/1307.          44.6/ 3/1076.
   CO  BCKGRD METER/RANGE/PPM                   .1/ 3/   2.            .1/ 3/   2.
   CO2 SAMPLE METER/RANGE/PCT                 94.2/ 3/ 1.77          40.4/ 2/ 2.15
   CO2 BCKGRD METER/RANGE/PCT                  3.6/ 3/  .06           1.5/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM                 59.4/ 3/ 178.          86.2/ 3/ 259.
   NOX BCKGRD METER/RANGE/PPM                   .3/ 3/   1.            .4/ 3/   1.
   DILUTION FACTOR                                4.98                   5.80
   HC  CONCENTRATION PPM                         192.                   239.
   CO  CONCENTRATION PPM                         1323.                  1011.
   CO2 CONCENTRATION PCT                         1.72                   2.11
   NOX CONCENTRATION PPM                         177.4                  257.6
   HC  MASS GRAMS                                23.39                  15.85
   CO  MASS GRAMS                               325.10                 135.56
   CO2 MASS GRAMS                               6645.8                 4447.4
   NOX MASS GRAMS                                63.47                  59.39
   RUN TIME              SECONDS                 1397.                  766.
        DFC, WET (DRY)                        .857 ( .847)           .830 ( .815)
        SCF, WET (DRY)                       1.000 ( .972)          1.000 ( .963)
        VOL (SCM)                                211.2                  115.2
        SAM BLR (SCM)                             0.00                   0.00
        KM  (MEASURED)                           21.55                  16.31

   TEST NUMBER,                                 711-32                 711-33
   BAROMETER,            MM HG                  745.5                  745.2
   HUMIDITY,             G/KG                    6.8                    12.1
   TEMPERATURE,          DEG C                  24.4                   26.7
    CARBON DIOXIDE,       G/KM                  308.4                  272.6
   FUEL CONSUMPTION,     L/100KM                14.32                  12.33

   HYDROCARBONS,         G/KM                    1.09                    .97
   CARBON MONOXIDE,      G/KM                   15.09                   8.31
   OXIDES OF NITROGEN,   G/KM                    2.95                   3.64
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TABLE D-4. TEST 712 EMISSIONS RESULTS

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                              FTP    VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                      PROJECT 11-5830-004

TEST NO.   712-11   RUN   1                  VEHICLE NO.71                   TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    70 OLDS.DELTA88             DATE   12/10/80                 ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                   BAG CART NO.  1                 GASOLINE  EM-433-F
TRANSMISSION A3                              DYNO NO.      3                 ODOMETER ****** KM(00141. MILES)
                                             CVS NO.   2

BAROMETER 753.62 MM HG(29.67 IN HG)          DRY BULB TEMP. 23.3 DEG C(74.0 DEG F)
RELATIVE HUMIDITY  27. PCT                   ABS. HUMIDITY  4.8 GM/KG        NOX HUMIDITY CORRECTION FACTOR  .84
BAG RESULTS
  BAG NUMBER                                       1                 2                 3                 4
  DESCRIPTION                               COLD TRANSIENT       STABILIZED      HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)               762.0 (30.0)      774.7 (30.5)      762.0 (30.0)      774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)             762.0 (30.0)      774.7 (30.5)      762.0 (30.0)      774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)            43.3 (110.0)      42.8 (109.0)      43.1 (109.5)      42.8 (109.0)
  BLOWER REVOLUTIONS                            40490.            69509.            40464.            69535.
  TOT FLOW STD. CU. METRES(SCF)                77.3 ( 2728.)    132.7 ( 4685.)     77.3 ( 2728.)    132.6 ( 4681.)
  HC   SAMPLE METER/RANGE/PPM                  28.1/ 3/ 281.     80.8/ 2/  81.     17.3/ 3/ 173.     77.5/ 2/  78.
  HC   BCKGRD METER/RANGE/PPM                    .9/ 3/   9.      9.0/ 2/   9.       .9/ 3/   9.      9.5/ 2/  10.
  CO   SAMPLE METER/RANGE/PPM                  65.3/ 2/3430.     66.0/11/ 270.     90.0/11/ 442.     65.5/11/ 267.
  CO   BCKGRD METER/RANGE/PPM                    .1/ 2/   4.      1.2/11/   3.       .7/11/   2.       .6/11/   2.
  CO2  SAMPLE METER/RANGE/PCT                  42.1/ 2/ 1.82     72.0/ 3/ 1.30     89.5/ 3/ 1.67     70.3/ 3/ 1.27
  CO2  BCKGRD METER/RANGE/PCT                   1.2/ 2/  .04      3.2/ 3/  .05      3.2/ 3/  .05      3.0/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM                  41.5/ 3/ 125.     48.2/ 2/  48.     45.3/ 3/ 136.     47.9/ 2/  48.
  NOX  BCKGRD METER/RANGE/PPM                    .1/ 3/   0.       .5/ 2/   1.       .2/ 3/   1.       .5/ 2/   1.
  DILUTION FACTOR                                6.15              10.01              7.76              10.28
  HC   CONCENTRATION PPM                         273.                73.              165.                69.
  CO   CONCENTRATION PPM                        3277.               258.              422.               257.
  CO2  CONCENTRATION PCT                         1.79               1.26              1.63               1.23
  NOX  CONCENTRATION PPM                        124.2               47.7             135.4               47.4
  HC   MASS GRAMS                               12.18               5.56              7.36               5.27
  CO   MASS GRAMS                              294.77              39.88             37.94              39.67
  CO2  MASS GRAMS                              2526.1             3063.1            2298.6             2982.9
  NOX  MASS GRAMS                               15.36              10.14             16.73              10.06

  HC   GRAMS/KM                                  2.11                .90              1.28                .85
  CO   GRAMS/KM                                 50.94               6.43              6.61               6.39
  CO2  GRAMS/KM                                 436.6              493.6             400.3              480.1
  NOX  GRAMS/KM                                  2.65               1.63              2.91               1.62
  FUEL CONSUMPTION BY CB L/100KM                22.34              21.82             17.78              21.03

  RUN TIME                   SECONDS             504.               868.              505.               868.
  MEASURED DISTANCE          KM                  5.79               6.21              5.74               6.21
       DFC, WET (DRY)                                   .877 ( .869)                        .891 ( .883)
       SCF, WET (DRY)                                  1.000 ( .978)                       1.000 ( .978)
       VOL (SCM)                                               210.0                               209.8
       SAM BLR (SCM)                                            0.00                                0.00
       KM  (MEASURED)                                          11.99                               11.96
       FUEL CONSUMPTION L/100KM                                21.97                               19.43

COMPOSITE RESULTS                                                                         3-BAG      (4-BAG)
   TEST NUMBER             712-11                          CARBON DIOXIDE       G/KM       436.2     ( 452.2)
   BAROMETER      MM HG     753.6                          FUEL CONSUMPTION     L/100KM    20.70     ( 20.52)
   HUMIDITY       G/KG        4.8                          HYDROCARBONS (THC)   G/KM        1.25     (  1.24)
   TEMPERATURE    DEG C      23.3                          CARBON MONOXIDE      G/KM       15.71     ( 15.70)
                                                           OXIDES OF NITROGEN   G/KM        2.20     (  2.19)
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                              SET    VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                      PROJECT 11-5830-004

TEST NO.   712-12   RUN   1                  VEHICLE NO.71                   TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    70 OLDS.DELT A 88           DATE   12/10/80                 ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                   BAG CART NO.  1                 GASOLINE  EM-433-F
TRANSMISSION A3                              DYNO NO.      3                 ODOMETER ****** KM(00141. MILES)
                                             CVS NO.   2

BAROMETER 753.36 MM HG(29.66 IN HG)          DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  25. PCT                   ABS. HUMIDITY  4.5 GM/KG        NOX HUMIDITY CORRECTION FACTOR  .83
BAG RESULTS
  TEST CYCLE                                     SET                    HFET

  BLOWER DIF P MM. H2O(IN. H2O)               774.7 (30.5)            774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)             774.7 (30.5)            774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)            43.3 (110.0)            43.1 (109.5)
  BLOWER REVOLUTIONS                           111989.                  61301.
  TOT FLOW STD. CU. METRES(SCF)               213.2 ( 7529.)          116.9 ( 4127.)
  HC   SAMPLE METER/RANGE/PPM                  15.9/ 3/ 159.           22.4/ 3/ 224.
  HC   BCKGRD METER/RANGE/PPM                   1.0/ 3/  10.            1.1/ 3/  11.
  CO   SAMPLE METER/RANGE/PPM                  89.6/11/ 438.           24.0/ 3/ 555.
  CO   BCKGRD METER/RANGE/PPM                    .7/11/   2.             .1/ 3/   2.
  CO2  SAMPLE METER/RANGE/PCT                  96.0/ 3/ 1.80           48.9/ 2/ 2.18
  CO2  BCKGRD METER/RANGE/PCT                   3.1/ 3/  .05            1.3/ 2/  .05
  NOX  SAMPLE METER/RANGE/PPM                  62.3/ 3/ 187.           91.3/ 3/ 274.
  NOX  BCKGRD METER/RANGE/PPM                    .1/ 3/   0.             .4/ 3/   1.
  DILUTION FACTOR                                7.20                    5.94
  HC   CONCENTRATION PPM                         150.                    215.
  CO   CONCENTRATION PPM                         418.                    327.
  CO2  CONCENTRATION PCT                         1.76                    2.14
  NOX  CONCENTRATION PPM                        186.6                   272.9
  HC   MASS GRAMS                               18.49                   14.48
  CO   MASS GRAMS                              103.70                   21.65
  CO2  MASS GRAMS                              6884.4                  4582.1
  NOX  MASS GRAMS                               63.26                   50.21
  RUN TIME                   SECONDS            1398.                    766.
       DFC, WET (DRY)                          .861 ( .854)            .832 ( .826)
       SCF, WET (DRY)                         1.000 ( .973)           1.000 ( .973)
       VOL (SCM)                                213.2                   116.9
       SAM BLR (SCM)                             0.00                    0.00
       KM  (MEASURED)                           21.46                   16.26

  TEST NUMBER,                                 712-12                  712-13
  BAROMETER,                MM HG               753.4                   753.1
  HUMIDITY,                 G/KG                  4.5                     4.2
  TEMPERATURE,              DEG C                23.9                    24.1
   CARBON DIOXIDE,           G/KM               320.8                   281.9
  FUEL CONSUMPTION,         L/100KM             14.13                   12.45

  HYDROCARBONS,             G/KM                  .86                     .89
  CARBON MONOXIDE,          G/KM                 4.83                    4.41
  OXIDES OF NITROGEN,       G/KM                 2.95                    3.09
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TABLE D-5. TEST 712 EMISSIONS RESULTS

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                         FTP   VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE
                                PROJECT 11-5830-004

TEST NO.  712-21   RUN                  VEHICLE NO.71                      TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS.DELTA88         DATE   12/11/80                    ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8              BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                         DYNO NO.      3                    ODOMETER ****** KM(80141. MILES)
                                        CVS NO.   2

BAROMETER 749.81 MM HG(29.52 IN HG)     DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  23. PCT              ABS. HUMIDITY  4.8 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .84
BAG RESULTS
  BAG NUMBER                                  1                 2                 3                 4
  DESCRIPTION                          COLD TRANSIENT       STABILIZED      HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)        762.0 (30.0)      774.7 (30.5)      762.0 (30.0)      774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)      762.0 (30.0)      774.7 (30.5)      762.0 (30.0)      774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)     43.9 (111.0)      43.3 (110.0)      43.3 (110.0)      43.3 (110.0)
  BLOWER REVOLUTIONS                      40433.            69634.            40537.            69568.
  TOT FLOW STD. CU. METRES(SCF)         76.7 ( 2707.)    131.9 ( 4658.)     76.9 ( 2716.)    131.8 ( 4653.)
  HC  SAMPLE METER/RANGE/PPM           23.9/ 4/2390.     12.6/ 4/1260.     17.8/ 4/1780.     12.3/ 4/1230.
  HC  BCKGRD METER/RANGE/PPM             .1/ 4/  10.       .2/ 4/  20.       .2/ 4/  20.       .3/ 4/  30.
  CO  SAMPLE METER/RANGE/PPM           63.9/ 2/3327.     79.6/11/ 359.     91.4/11/ 454.     70.8/11/ 300.
  CO  BCKGRD METER/RANGE/PPM             .3/ 2/  11.      2.7/11/   8.      1.7/11/   5.      1.6/11/   5.
  CO2 SAMPLE METER/RANGE/PCT           93.8/ 3/ 1.76     68.5/ 3/ 1.23     86.7/ 3/ 1.61     67.0/ 3/ 1.20
  CO2 BCKGRD METER/RANGE/PCT            3.8/ 3/  .06      4.0/ 3/  .06      4.3/ 3/  .07      4.2/ 3/  .06
  NOX SAMPLE METER/RANGE/PPM           46.6/ 3/ 140.     63.1/ 2/  63.     53.2/ 3/ 160.     60.3/ 2/  60.
  NOX BCKGRD METER/RANGE/PPM             .2/ 3/   1.      1.0/ 2/   1.       .4/ 3/   1.      1.3/ 2/   1.
  DILUTION FACTOR                          5.79              9.61              7.32              9.89
  HC  CONCENTRATION PPM                  2382.             1242.             1763.             1203.
  CO  CONCENTRATION PPM                  3181.              341.              432.              287.
  CO2 CONCENTRATION PCT                  1.71              1.18              1.55              1.15
  NOX CONCENTRATION PPM                  139.3              62.2             158.6              59.1
  HC  MASS GRAMS                         105.29             94.47             78.19             91.41
  CO  MASS GRAMS                         283.88             52.41             38.70             43.96
  CO2 MASS GRAMS                         2399.9            2846.5            2186.1            2763.3
  NOX MASS GRAMS                          17.10             13.14             19.53             12.48

  HC  GRAMS/KM                            18.22             15.13             13.63             14.94
  CO  GRAMS/KM                            49.14              8.39              6.75              7.18
  CO2 GRAMS/KM                            415.4             455.7             381.0             451.6
  NOX GRAMS/KM                             2.96              2.10              3.40              2.04
  FUEL CONSUMPTION BY CB L/100KM          23.49             22.06             18.56             21.78

  RUN TIME               SECONDS          504.              868.              505.              868.
  MEASURED DISTANCE      KM               5.78              6.25              5.74              6.12
      DFC, WET (DRY)                             .871 ( .864)                        .886 ( .879)
      SCF, WET (DRY)                            1.000 ( .979)                       1.000 ( .980)
      VOL (SCM)                                       208.6                               208.7
      SAM BLR (SCM)                                    0.00                                0.00
      KM  (MEASURED)                                  12.02                               11.86
      FUEL CONSUMPTION L/100KM                        22.75                               20.22

COMPOSITE RESULTS                                                                    3-BAG      (4-BAG)
   TEST NUMBER           721-21                     CARBON DIOXIDE       G/KM        427.0      ( 425.6)
   BAROMETER     MM HG   749.8                      FUEL CONSUMPTION     L/100KM     21.40      ( 21.31)
   HUMIDITY      G/KG      4.8                      HYDROCARBONS (THC)   G/KM        15.36      ( 15.30)
   TEMPERATURE   DEG C    26.1                      CARBON MONOXIDE      G/KM        16.34      ( 16.00)
                                                    OXIDES OF NITROGEN   G/KM         2.64      (  2.62)
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                        SET   VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE
                               PROJECT 11-5830-004

TEST NO.   712-22   RUN                 VEHICLE NO.71                      TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    70 OLDS.DELTA88        DATE   12/11/80                    ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8              BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                         DYNO NO.      3                    ODOMETER ****** KM(80141. MILES)
                                        CVS NO.   2

BAROMETER 751.33 MM HG(29.58 IN HG)     DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  24. PCT              ABS. HUMIDITY  5.2 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .85
BAG RESULTS
  TEST CYCLE                                 SET                    HFET

  BLOWER DIF P MM. H2O(IN. H2O)        774.7 (30.5)            774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)      774.7 (30.5)            774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)     43.1 (109.5)            43.3 (110.0)
  BLOWER REVOLUTIONS                     111894.                 61333.
  TOT FLOW STD. CU. METRES(SCF)        212.5 ( 7504.)          116.3 ( 4105.)
  HC  SAMPLE METER/RANGE/PPM           18.9/ 4/1890.           23.5/ 4/2350.
  HC  BCKGRD METER/RANGE/PPM             .3/ 4/  30.             .2/ 4/  20.
  CO  SAMPLE METER/RANGE/PPM           94.6/11/ 483.           23.5/ 3/ 543.
  CO  BCKGRD METER/RANGE/PPM            1.1/11/   3.             .1/ 3/   2.
  CO2 SAMPLE METER/RANGE/PCT           93.8/ 3/ 1.76           48.7/ 2/ 2.17
  CO2 BCKGRD METER/RANGE/PCT            3.6/ 3/  .06            1.4/ 2/  .05
  NOX SAMPLE METER/RANGE/PPM           76.0/ 3/ 220.           32.4/ 4/ 324.
  NOX BCKGRD METER/RANGE/PPM             .4/ 3/   1.             .1/ 4/   1.
  DILUTION FACTOR                          6.72                    5.46
  HC  CONCENTRATION PPM                  1864.                   2334.
  CO  CONCENTRATION PPM                   460.                    514.
  CO2 CONCENTRATION PCT                   1.71                    2.13
  NOX CONCENTRATION PPM                  227.0                   323.2
  HC  MASS GRAMS                         228.48                  156.45
  CO  MASS GRAMS                         113.85                   69.62
  CO2 MASS GRAMS                         6457.6                  4529.9
  NOX MASS GRAMS                          77.98                   60.55
  RUN TIME               SECONDS         1397.                    766.
      DFC, WET (DRY)                   .851 ( .845)            .817 ( .810)
      SCF, WET (DRY)                  1.000 ( .976)           1.000 ( .972)
      VOL (SCM)                          212.5                   116.3
      SAM BLR (SCM)                       0.00                    0.00
      KM  (MEASURED)                     21.55                   16.30

  TEST NUMBER,                           712-22                  712-23
  BAROMETER,            MM HG            751.3                   750.3
  HUMIDITY,             G/KG               5.2                     5.0
  TEMPERATURE,          DEG C             26.7                    25.6
   CARBON DIOXIDE,       G/KM            309.0                   277.9
  FUEL CONSUMPTION,     L/100KM          14.98                   13.45

  HYDROCARBONS,         G/KM             10.60                    9.60
  CARBON MONOXIDE,      G/KM              5.28                    4.27
  OXIDES OF NITROGEN,   G/KM              3.62                    3.71
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TABLE D-6. TEST 712 EMISSIONS RESULTS

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                                FTP    VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE
                                         PROJECT 11-5830-004

TEST NO.   712-41   RUN   1            VEHICLE NO.71                 TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    70 OLDS DELTA88       DATE   12/20/80               ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8             BAG CART NO.  1               GASOLINE  EM-433-F
TRANSMISSION A3                        DYNO NO.      3               ODOMETER ###### KM(80142. MILES)
                                       CVS NO.   2

BAROMETER 757.43 MM HG(29.82 IN HG)    DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  22. PCT             ABS. HUMIDITY  4.3 GM/KG     NOX HUMIDITY CORRECTION FACTOR   .82
BAG RESULTS
   BAG NUMBER                                1                 2                  3                 4
   DESCRIPTION                        COLD TRANSIENT      STABILIZED        HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)      774.7 (30.5)      774.7 (30.5)      762.0 (30.0)      774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)    762.0 (30.0)      762.0 (30.0)      749.3 (29.5)      762.0 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)   43.3 (110.0)      43.3 (110.0)      42.8 (109.0)      43.3 (110.0)
   BLOWER REVOLUTIONS                   40634.            69473.            40500.            69514.
   TOT FLOW STD. CU. METRES(SCF)       77.9 ( 2752.)    133.3 ( 4705.)     77.9 ( 2751.)    133.3 ( 4708.)
   HC  SAMPLE METER/RANGE/PPM        24.2/ 4/2420.     13.2/ 4/1320.     17.4/ 4/1740.     13.0/ 4/1300.
   HC  BCKGRD METER/RANGE/PPM          .1/ 4/  10.       .2/ 4/  20.       .1/ 4/  10.       .3/ 4/  30.
   CO  SAMPLE METER/RANGE/PPM        58.3/ 2/2933.     84.5/11/ 396.     93.4/11/ 472.     76.1/11/ 335.
   CO  BCKGRD METER/RANGE/PPM          .1/ 2/   4.       .1/11/   0.       .1/11/   0.       .4/11/   1.
   CO2 SAMPLE METER/RANGE/PCT        43.4/ 2/ 1.89     70.4/ 3/ 1.27     89.7/ 3/ 1.67     69.4/ 3/ 1.25
   CO2 BCKGRD METER/RANGE/PCT         1.5/ 2/  .05      3.2/ 3/  .05      3.1/ 3/  .05      3.2/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM        53.0/ 3/ 159.     74.8/ 2/  75.     57.7/ 3/ 173.     78.4/ 2/  78.
   NOX BCKGRD METER/RANGE/PPM          .2/ 3/   1.       .8/ 2/   1.       .2/ 2/   0.       .9/ 2/   1.
   DILUTION FACTOR                        5.55              9.29              7.09              9.47
   HC  CONCENTRATION PPM                 2412.             1302.             1731.             1273.
   CO  CONCENTRATION PPM                 2821.              384.              453.              323.
   CO2 CONCENTRATION PCT                 1.84              1.23              1.63              1.21
   NOX CONCENTRATION PPM                158.5              74.1             172.9              77.6
   HC  MASS GRAMS                      108.40            100.06             77.77             97.88
   CO  MASS GRAMS                      256.00             59.51             41.07             50.18
   CO2 MASS GRAMS                      2632.4            2997.5            2326.4            2949.2
   NOX MASS GRAMS                       19.49             15.57             21.25             16.32

   HC  GRAMS/KM                         17.60             15.36             12.67             14.82
   CO  GRAMS/KM                         41.57              9.13              6.69              7.60
   CO2 GRAMS/KM                         427.4             460.1             378.9             446.6
   NOX GRAMS/KM                          3.16              2.39              3.46              2.47
   FUEL CONSUMPTION BY CB L/100KM       23.42             22.33             18.34             21.38

   RUN TIME            SECONDS          506.              866.              505.              867.
   MEASURED DISTANCE   KM               6.16              6.52              6.14              6.60
         DFC, WET (DRY)                       .846 ( .859)                        .881 ( .875)
         SCF, WET (DRY)                      1.000 ( .979)                       1.000 ( .980)
         VOL (SCM)                                  211.2                               211.2
         SAM BLR (SCM)                               0.00                                0.00
         KM  (MEASURED)                             12.67                               12.74
         FUEL CONSUMPTION L/100KM                   22.86                               20.02

COMPOSITE RESULTS                                                                      3-BAG      (4-BAG)
   TEST NUMBER          712-41                  CARBON DIOXIDE        G/KM             430.8      ( 427.0)
   BAROMETER     MM HG  757.4                   FUEL CONSUMPTION      L/100KM          21.45      ( 21.24)
   HUMIDITY      G/KG     4.3                   HYDROCARBONS (THC)    G/KM             15.08      ( 14.93)
   TEMPERATURE   DEG C   24.4                   CARBON MONOXIDE       G/KM             15.23      ( 14.79)
                                                OXIDES OF NITROGEN    G/KM              2.83      (  2.87)
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                                SET    VEHICLE EMISSIONS RESULTS   - 12 PERCENT MISFIRE
                                         PROJECT 11-5830-004

TEST NO.   712-42   RUN   1            VEHICLE NO.71                 TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL    70 OLDS DELTA88       DATE   12/20/80               ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8             BAG CART NO.  1               GASOLINE  EM-433-F
TRANSMISSION A3                        DYNO NO.      3               ODOMETER ###### KM(80142. MILES)
                                       CVS NO.   2

BAROMETER 757.17 MM HG(29.81 IN HG)    DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  17. PCT             ABS. HUMIDITY  3.6 GM/KG     NOX HUMIDITY CORRECTION FACTOR   .81
BAG RESULTS
   TEST CYCLE                               SET                       HFET

   BLOWER DIF P MM. H2O(IN. H2O)      787.4 (31.0)              800.1 (31.5)
   BLOWER INLET P MM. H2O(IN. H2O)    774.7 (30.5)              787.4 (31.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)   43.3 (110.0)              43.3 (110.0)
   BLOWER REVOLUTIONS                  111867.                    61293.
   TOT FLOW STD. CU. METRES(SCF)      214.1 ( 7560.)            117.0 ( 4133.)
   HC  SAMPLE METER/RANGE/PPM        19.5/ 4/1950.             24.2/ 4/2420.
   HC  BCKGRD METER/RANGE/PPM          .2/ 4/  20.               .2/ 4/  20.
   CO  SAMPLE METER/RANGE/PPM        98.6/11/ 522.             26.3/ 3/ 611.
   CO  BCKGRD METER/RANGE/PPM          .2/11/   1.               .2/ 3/   5.
   CO2 SAMPLE METER/RANGE/PCT        98.4/ 3/ 1.85             50.8/ 2/ 2.28
   CO2 BCKGRD METER/RANGE/PCT         2.8/ 3/  .04              1.3/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM        82.3/ 3/ 247.             37.4/ 4/ 374.
   NOX BCKGRD METER/RANGE/PPM          .3/ 3/   1.               .1/ 4/   1.
   DILUTION FACTOR                        6.30                      5.19
   HC  CONCENTRATION PPM                 1933.                     2404.
   CO  CONCENTRATION PPM                  500.                      577.
   CO2 CONCENTRATION PCT                 1.82                      2.25
   NOX CONCENTRATION PPM                246.1                     373.2
   HC  MASS GRAMS                      238.65                    162.24
   CO  MASS GRAMS                      124.54                     78.57
   CO2 MASS GRAMS                      7128.7                    4012.8
   NOX MASS GRAMS                       81.57                     68.04
   RUN TIME            SECONDS          1397.                      766.
         DFC, WET (DRY)               .843 ( .839)              .807 ( .802)
         SCF, WET (DRY)              1.000 ( .977)             1.000 ( .973)
         VOL (SCM)                        214.1                     117.0
         SAM BLR (SCM)                     0.00                      0.00
         KM  (MEASURED)                   23.09                     17.40

   TEST NUMBER,                          712-42                    712-43
   BAROMETER,            MM HG            757.2                     756.9
   HUMIDITY,             G/KG               3.6                       3.8
   TEMPERATURE,          DEG C             26.1                      25.6
    CARBON DIOXIDE,       G/KM            308.7                     276.5
   FUEL CONSUMPTION,     L/100KM          14.94                     13.37

   HYDROCARBONS,         G/KM             10.33                      9.32
   CARBON MONOXIDE,      G/KM              5.39                      4.51
   OXIDES OF NITROGEN,   G/KM              3.53                      3.91
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TABLE D-7. TEST 712 EMISSIONS RESULTS

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                                        FTP    VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE PLUS UNKNOWN MALFUNCTION
                                                 PROJECT 11-5830-004

TEST NO.   712-31   RUN   1                    VEHICLE NO.71                       TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS. DELTA 88              DATE   12/12/80                     ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                     BAG CART NO.  1                     GASOLINE  EM-433-F
TRANSMISSION A3                                DYNO NO.      3                     ODOMETER ****** KM(80141. MILES)
                                               CVS NO.   2

BAROMETER 748.54 MM HG(29.47 IN HG)            DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  27. PCT                     ABS. HUMIDITY  5.3 GM/KG            NOX HUMIDITY CORRECTION FACTOR   .85
BAG RESULTS
  BAG NUMBER                                        1                  2                  3                  4
  DESCRIPTION                                COLD TRANSIENT       STABILIZED        HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)              762.0 (30.0)       774.7 (30.5)       762.0 (30.0)       774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)            762.0 (30.0)       774.7 (30.5)       762.0 (30.0)       774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)           43.3 (110.0)       42.8 (109.0)       42.8 (109.0)       42.8 (109.0)
  BLOWER REVOLUTIONS                           40573.             69622.             40511.             69570.
  TOT FLOW STD. CU. METRES(SCF)               76.9 ( 2714.)     131.8 ( 4653.)      76.8 ( 2712.)     131.7 ( 4650.)
  HC   SAMPLE METER/RANGE/PPM                53.1/ 4/5310.      28.5/ 4/2850.      39.8/ 4/3980.      28.0/ 4/2800.
  HC   BCKGRD METER/RANGE/PPM                  .2/ 4/  20.        .5/ 4/  50.        .5/ 4/  50.        .4/ 4/  40.
  CO   SAMPLE METER/RANGE/PPM                64.9/ 2/3400.      93.7/11/ 475.      27.4/ 3/ 637.      80.7/11/ 368.
  CO   BCKGRD METER/RANGE/PPM                  .2/ 2/   8.       2.7/11/   8.        .1/ 3/   2.       2.1/11/   6.
  CO2  SAMPLE METER/RANGE/PCT                93.3/ 3/ 1.73      66.1/ 3/ 1.19      85.7/ 3/ 1.59      64.0/ 3/ 1.14
  CO2  BCKGRD METER/RANGE/PCT                 3.3/ 3/  .05       4.5/ 3/  .07       4.1/ 3/  .06       3.7/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM                51.0/ 3/ 153.      73.4/ 2/  73.      56.4/ 3/ 169.      73.3/ 2/  73.
  NOX  BCKGRD METER/RANGE/PPM                  .3/ 3/   1.       1.3/ 2/   1.        .4/ 3/   1.       1.1/ 2/   1.
  DILUTION FACTOR                                 5.19               8.84               4.54               9.19
  HC   CONCENTRATION PPM                         5294.              2806.              3938.              2764.
  CO   CONCENTRATION PPM                         3252.               453.               611.               351.
  CO2  CONCENTRATION PCT                         1.69               1.12               1.53               1.09
  NOX  CONCENTRATION PPM                         152.3               72.2              168.2               72.3
  HC   MASS GRAMS                               234.61             213.17             174.40             209.89
  CO   MASS GRAMS                               290.96              69.44              54.60              53.79
  CO2  MASS GRAMS                               2372.0             2711.1             2158.5             2633.4
  NOX  MASS GRAMS                                19.00              15.45              20.97              15.46

  HC   GRAMS/KM                                 40.58              34.30              30.35              34.10
  CO   GRAMS/KM                                 50.33              11.17               9.50               8.74
  CO2  GRAMS/KM                                 410.3              436.2              375.6              427.8
  NOX  GRAMS/KM                                  3.29               2.49               3.65               2.51
  FUEL CONSUMPTION BY CB L/100KM                26.38              24.01              20.78              23.46

  RUN TIME              SECONDS                  505.               868.               505.               868.
  MEASURED DISTANCE     KM                       5.78               6.21               5.75               6.16
       DFC, WET (DRY)                                   .858 ( .850)                         .875 ( .867)
       SCF, WET (DRY)                                  1.000 ( .979)                        1.000 ( .979)
       VOL (SCM)                                              208.6                                208.5
       SAM BLR (SCM)                                           0.00                                 0.00
       KM  (MEASURED)                                         12.00                                11.90
       FUEL CONSUMPTION L/100KM                               25.16                                22.17

                                                                                                3-BAG      (4-BAG)
COMPOSITE RESULTS                                                    CARBON DIOXIDE      G/KM     414.3      ( 411.7)
   TEST NUMBER             712-31                                    FUEL CONSUMPTION    L/100KM   23.62     ( 23.45)
   BAROMETER    MM HG      748.5                                     HYDROCARBONS (THC)  G/KM      34.52     ( 34.46)
   HUMIDITY     G/KG         5.3                                     CARBON MONOXIDE     G/KM      10.83     ( 10.11)
   TEMPERATURE  DEG C       25.0                                     OXIDES OF NITROGEN  G/KM       2.97     (  2.98)
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                                       SET    VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE PLUS UNKNOWN MALFUNCTION
                                                PROJECT 11-5830-004

TEST NO.   712-32   RUN   1                    VEHICLE NO.71                       TEST WEIGHT  2041. KG( 4500. LBS)
VEHICLE MODEL   70 OLDS.DELTA88                DATE   12/12/80                     ACTUAL ROAD LOAD   9.5 KW( 12.7 HP)
ENGINE 7.5 L(455. CID) V-8                     BAG CART NO.  1                     GASOLINE  EM-433-F
TRANSMISSION A3                                DYNO NO.      3                     ODOMETER ****** KM(80141. MILES)
                                               CVS NO.   2

BAROMETER 748.54 MM HG(29.47 IN HG)            DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  28. PCT                     ABS. HUMIDITY  5.7 GM/KG            NOX HUMIDITY CORRECTION FACTOR   .86
BAG RESULTS
  TEST CYCLE                                        SET                  HFET

  BLOWER DIF P MM. H2O(IN. H2O)              774.7 (30.5)           774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)            774.7 (30.5)           774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)           43.6 (110.5)           43.3 (110.0)
  BLOWER REVOLUTIONS                           111946.                61295.
  TOT FLOW STD. CU. METRES(SCF)              211.5 ( 7470.)         115.8 ( 4087.)
  HC   SAMPLE METER/RANGE/PPM                44.2/ 4/4420.          55.3/ 4/5530.
  HC   BCKGRD METER/RANGE/PPM                  .3/ 4/  30.            .5/ 4/  50.
  CO   SAMPLE METER/RANGE/PPM                28.0/ 3/ 652.          27.5/ 3/ 640.
  CO   BCKGRD METER/RANGE/PPM                  .1/ 3/   2.            .2/ 3/   5.
  CO2  SAMPLE METER/RANGE/PCT                93.4/ 3/ 1.75          48.1/ 2/ 2.14
  CO2  BCKGRD METER/RANGE/PCT                 3.5/ 3/  .05           1.3/ 2/  .05
  NOX  SAMPLE METER/RANGE/PPM                73.6/ 3/ 221.          34.9/ 4/ 349.
  NOX  BCKGRD METER/RANGE/PPM                  .5/ 3/   2.            .2/ 4/   2.
  DILUTION FACTOR                                 5.94                   4.87
  HC   CONCENTRATION PPM                         4395.                  5490.
  CO   CONCENTRATION PPM                          622.                   605.
  CO2  CONCENTRATION PCT                         1.70                   2.10
  NOX  CONCENTRATION PPM                         219.6                  347.4
  HC   MASS GRAMS                               536.12                 366.46
  CO   MASS GRAMS                               153.30                  81.47
  CO2  MASS GRAMS                               6603.6                 4449.9
  NOX  MASS GRAMS                                76.17                  66.23
  RUN TIME              SECONDS                  1397.                  765.
       DFC, WET (DRY)                        .832 ( .824)           .795 ( .788)
       SCF, WET (DRY)                       1.000 ( .975)          1.000 ( .972)
       VOL (SCM)                                 211.5                  115.8
       SAM BLR (SCM)                              0.00                   0.00
       KM  (MEASURED)                            21.54                  16.30

  TEST NUMBER,                                  712-32                 712-33
  BAROMETER,            MM HG                    748.5                  747.8
  HUMIDITY,             G/KG                       5.7                    5.8
  TEMPERATURE,          DEG C                     25.6                   26.7
   CARBON DIOXIDE,       G/KM                    306.6                  273.1
  FUEL CONSUMPTION,     L/100KM                  16.94                  15.04

  HYDROCARBONS,         G/KM                     24.89                  22.49
  CARBON MONOXIDE,      G/KM                      7.12                   5.00
  OXIDES OF NITROGEN,   G/KM                      3.54                   4.06
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TABLE D-8. TEST 721 EMISSIONS RESULTS

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                          FTP   VEHICLE EMISSIONS RESULTS  - UNMODIFIED
                                 PROJECT 11-5830-004

TEST NO.   721-1    RUN   1                 VEHICLE NO.72                     TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.          DATE   10/21/80                   ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                  BAG CART NO.  1                   GASOLINE  EM-433-F
TRANSMISSION M3                             DYNO NO.      3                   ODOMETER 99314. KM(61711. MILES)
                                            CVS NO.   2

BAROMETER 744.22 MM HG(29.30 IN HG)         DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)   NOX HUMIDITY CORRECTION FACTOR   .97
RELATIVE HUMIDITY  51. PCT                  ABS. HUMIDITY  9.7 GM/KG
BAG RESULTS
   BAG NUMBER                                      1               2                 3                4
   DESCRIPTION                              COLD TRANSIENT     STABILIZED      HOT TRANSIENT      STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)            762.0 (30.0)      756.9 (29.8)      749.3 (29.5)      749.3 (29.5)
   BLOWER INLET P MM. H2O(IN. H2O)          741.7 (29.2)      741.7 (29.2)      736.6 (29.0)      736.6 (29.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)         42.8 (109.0)      42.2 (108.0)      43.3 (110.0)      42.2 (108.0)
   BLOWER REVOLUTIONS                         40614.            69643.            40520.            69568.
   TOT FLOW STD. CU. METRES(SCF)             76.7 ( 2708.)    131.7 ( 4649.)     76.5 ( 2702.)    131.6 ( 4648.)
   HC   SAMPLE METER/RANGE/PPM              35.5/ 3/ 355.     13.0/ 3/ 130.     21.9/ 3/ 219.     12.8/ 3/ 128.
   HC   BCKGRD METER/RANGE/PPM               1.1/ 3/  11.      1.3/ 3/  13.      1.4/ 3/  14.      1.4/ 3/  14.
   CO   SAMPLE METER/RANGE/PPM              62.1/ 2/3197.     92.8/11/ 446.     42.1/ 3/1009.     96.1/11/ 497.
   CO   BCKGRD METER/RANGE/PPM                .2/ 2/   8.      2.4/11/   7.       .4/ 3/   9.      2.0/11/   6.
   CO2  SAMPLE METER/RANGE/PCT              43.0/ 3/ 1.12     43.6/ 3/  .73     59.0/ 3/ 1.04     42.6/ 3/  .73
   CO2  BCKGRD METER/RANGE/PCT               3.7/ 3/  .06      3.8/ 3/  .06      3.9/ 3/  .06      3.8/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM              71.9/ 2/  72.     43.9/ 2/  44.     92.2/ 2/  92.     41.9/ 2/  42.
   NOX  BCKGRD METER/RANGE/PPM               1.0/ 2/   1.      1.0/ 2/   1.       .9/ 2/   1.      1.0/ 2/   1.
   DILUTION FACTOR                              9.14             16.48             11.53             17.02
   HC   CONCENTRATION PPM                       345.              118.              206.              115.
   CO   CONCENTRATION PPM                      3069.              445.              964.              476.
   CO2  CONCENTRATION PCT                       1.07               .69               .99               .67
   NOX  CONCENTRATION PPM                       71.0              43.0              91.4              41.0
   HC   MASS GRAMS                             15.27              8.94              9.10              8.71
   CO   MASS GRAMS                            273.98             68.27             85.90             73.01
   CO2  MASS GRAMS                            1505.6            1444.0            1384.7            1610.0
   NOX  MASS GRAMS                             10.07             10.46             12.93              9.97

   HC   GRAMS/KM                                2.61              1.42              1.56              1.37
   CO   GRAMS/KM                               44.90             10.85             14.74             11.51
   CO2  GRAMS/KM                               257.7             264.3             237.6             255.1
   NOX  GRAMS/KM                                1.72              1.66              2.22              1.57
   FUEL CONSUMPTION BY CB L/100KM              14.50             12.21             11.34             11.85

   RUN TIME               SECONDS               505.              867.              505.              867.
   MEASURED DISTANCE      KM                    5.84              6.29              5.83              6.34
         DFC, WET (DRY)                              .922 ( .907)                        .931 ( .916)
         SCF, WET (DRY)                             1.000 ( .975)                       1.000 ( .976)
         VOL (SCM)                                          208.4                               208.1
         SAM BLR (SCM)                                       0.00                                0.00
         KM  (MEASURED)                                     12.13                               12.17
         FUEL CONSUMPTION L/100KM                           13.31                               11.60

                                                                                        3-BAG     (4-BAG)
COMPOSITE RESULTS                                         CARBON DIOXIDE       G/KM     255.7    ( 252.9)
   TEST NUMBER           721-11                           FUEL CONSUMPTION     L/100KM  12.45    ( 12.34)
   BAROMETER     MM HG   744.2                            HYDROCARBONS (THC)   G/KM      1.71    (  1.69)
   HUMIDITY      G/KG      9.7                            CARBON MONOXIDE      G/KM     19.38    ( 19.37)
   TEMPERATURE   DEG C    23.9                            OXIDES OF NITROGEN   G/KM      1.83    (  1.80)
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                                VEHICLE EMISSIONS RESULTS  - UNMODIFIED
                                 PROJECT 11-5830-004

TEST NO.   721-1    RUN   1                 VEHICLE NO.72                     TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.          DATE   10/21/80                   ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                  BAG CART NO.  1                   GASOLINE  EM-433-F
TRANSMISSION M3                             DYNO NO.      3                   ODOMETER 99337. KM(61725. MILES)
                                            CVS NO.   2

BAROMETER 744.22 MM HG(29.30 IN HG)         DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  45. PCT                  ABS. HUMIDITY  8.8 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .94
BAG RESULTS
   TEST CYCLE                                   SET                   HFET

   BLOWER DIF P MM. H2O(IN. H2O)            756.9 (29.8)          767.1 (30.2)
   BLOWER INLET P MM. H2O(IN. H2O)          736.6 (29.0)          751.8 (29.6)
   BLOWER INLET TEMP. DEG. C(DEG. F)         42.8 (109.0)          43.3 (110.0)
   BLOWER REVOLUTIONS                         112079.               61397.
   TOT FLOW STD. CU. METRES(SCF)            211.8 ( 7478.)        115.6 ( 4083.)
   HC   SAMPLE METER/RANGE/PPM              16.6/ 3/ 166.         18.0/ 3/ 180.
   HC   BCKGRD METER/RANGE/PPM               1.5/ 3/  15.          1.6/ 3/  16.
   CO   SAMPLE METER/RANGE/PPM              23.3/ 3/ 538.         90.9/11/ 449.
   CO   BCKGRD METER/RANGE/PPM                .1/ 3/   2.          1.9/11/   6.
   CO2  SAMPLE METER/RANGE/PCT              67.9/ 3/ 1.22         84.5/ 3/ 1.56
   CO2  BCKGRD METER/RANGE/PCT               4.2/ 3/  .06          4.2/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM              49.4/ 3/ 148.         71.4/ 3/ 214.
   NOX  BCKGRD METER/RANGE/PPM                .2/ 3/   1.           .4/ 3/   1.
   DILUTION FACTOR                              10.39                 8.25
   HC   CONCENTRATION PPM                       152.                  166.
   CO   CONCENTRATION PPM                       516.                  424.
   CO2  CONCENTRATION PCT                       1.16                  1.51
   NOX  CONCENTRATION PPM                       147.7                 213.1
   HC   MASS GRAMS                              18.62                 11.06
   CO   MASS GRAMS                             127.20                 57.07
   CO2  MASS GRAMS                             4510.2                3189.1
   NOX  MASS GRAMS                              56.18                 45.88
   RUN TIME               SECONDS               1397.                 765.
         DFC, WET (DRY)                      .904 ( .891)          .879 ( .865)
         SCF, WET (DRY)                     1.000 ( .974)         1.000 ( .970)
         VOL (SCM)                              211.8                 115.6
         SAM BLR (SCM)                           0.00                  0.00
         KM  (MEASURED)                         21.98                 16.45

   TEST NUMBER,                                721-12                721-13
   BAROMETER,             MM HG                 744.2                 744.0
   HUMIDITY,              G/KG                    8.8                   9.9
   TEMPERATURE,           DEG C                  24.4                  25.0
    CARBON DIOXIDE,        G/KM                 205.2                 193.8
   FUEL CONSUMPTION,      L/100KM                9.26                  8.60

   HYDROCARBONS,          G/KM                    .05                   .47
   CARBON MONOXIDE,       G/KM                   5.79                  3.47
   OXIDES OF NITROGEN,    G/KM                   2.56                  2.79
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TABLE D-9. TEST 721 EMISSIONS RESULTS

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                                FTP    VEHICLE EMISSIONS RESULTS  - RICH BEST IDLE
                                        PROJECT 11-5830-004

TEST NO.   721-2   RUN                      VEHICLE NO.72                 TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.          DATE    10/30/80              ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                  BAG CART NO.  1               GASOLINE  EM-433-F
TRANSMISSION M3                             DYNO NO.      3               ODOMETER 99438. KM(61788. MILES)
                                            CVS NO.   2

BAROMETER 753.62 MM HG(29.67 IN HG)         DRY BULB TEMP. 27.8 DEG C(82.0 DEG F)
RELATIVE HUMIDITY  15. PCT                  ABS. HUMIDITY  3.5 GM/KG      NOX HUMIDITY CORRECTION FACTOR   .81
BAG RESULTS
  BAG NUMBER                                      1               2               3               4
  DESCRIPTION                               COLD TRANSIENT    STABILIZED    HOT TRANSIENT     STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             767.1 (30.2)    767.1 (30.2)    762.0 (30.0)    762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)           749.3 (29.5)    749.3 (29.5)    749.3 (29.5)    749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)    41.9 (107.5)    43.6 (110.5)    42.8 (109.0)
  BLOWER REVOLUTIONS                           40539.          69573.          40472.          69497.
  TOT FLOW STD. CU. METRES(SCF)              77.5 ( 2735.)  133.3 ( 4705.)   77.3 ( 2730.)  132.9 ( 4694.)
  HC  SAMPLE METER/RANGE/PPM                34.1/ 3/ 341.   20.6/ 3/ 206.   26.3/ 3/ 263.   21.0/ 3/ 210.
  HC  BCKGRD METER/RANGE/PPM                 1.0/ 3/  10.    1.2/ 3/  12.    1.2/ 3/  12.    1.3/ 3/  13.
  CO  SAMPLE METER/RANGE/PPM                62.0/ 2/3190.   58.1/ 3/1454.   61.1/ 3/1544.   59.0/ 3/1481.
  CO  BCKGRD METER/RANGE/PPM                  .1/ 2/   4.     .2/ 3/   5.     .1/ 3/   2.     .3/ 3/   7.
  CO2 SAMPLE METER/RANGE/PCT                63.2/ 3/ 1.13   40.2/ 3/  .68   54.9/ 3/  .96   38.8/ 3/  .66
  CO2 BCKGRD METER/RANGE/PCT                 4.0/ 3/  .06    4.2/ 3/  .06    4.0/ 3/  .06    3.9/ 3/  .06
  NOX SAMPLE METER/RANGE/PPM                89.9/ 2/  90.   53.7/ 2/  54.   33.6/ 3/ 101.   51.9/ 2/  52.
  NOX BCKGRD METER/RANGE/PPM                 1.4/ 2/   1.    1.6/ 2/   2.     .5/ 3/   2.    1.8/ 2/   2.
  DILUTION FACTOR                               9.11           15.86           11.76           16.30
  HC  CONCENTRATION PPM                         332.           195.            252.            198.
  CO  CONCENTRATION PPM                        3102.           1424.           1506.           1449.
  CO2 CONCENTRATION PCT                        1.07            .62             .91             .60
  NOX CONCENTRATION PPM                        88.7            52.2            99.4            50.2
  HC  MASS GRAMS                               14.83           14.96           11.23           15.16
  CO  MASS GRAMS                              279.74          220.93          135.49          224.21
  CO2 MASS GRAMS                              1520.5          1515.1          1282.4          1450.6
  NOX MASS GRAMS                               10.60           10.74           11.87           10.31

  HC  GRAMS/KM                                  2.54            2.39            1.93            2.41
  CO  GRAMS/KM                                 47.87           35.25           23.33           35.64
  CO2 GRAMS/KM                                 260.2           241.7           220.9           231.8
  NOX GRAMS/KM                                  1.81            1.71            2.04            1.64
  FUEL CONSUMPTION BY CB L/100KM               14.66           13.00           11.25           12.61

  RUN TIME             SECONDS                  505.            867.            505.            867.
  MEASURED DISTANCE    KM                       5.84            6.27            5.81            6.29
       DFC, WET (DRY)                               .920 ( .915)                    .930 ( .925)
       SCF, WET (DRY)                              1.000 ( .987)                   1.000 ( .988)
       VOL (SCM)                                        210.7                           210.2
       SAM BLR (SCM)                                     0.00                            0.00
       KM  (MEASURED)                                   12.11                           12.10
       FUEL CONSUMPTION L/100KM                         13.80                           11.96

COMPOSITE RESULTS                                                                       3-BAG        (4-BAG)
  TEST NUMBER           721-21                        CARBON DIOXIDE       G/KM       239.8       ( 236.9)
  BAROMETER     MM HG   753.6                         FUEL CONSUMPTION     L/100KM    12.87       ( 12.73)
  HUMIDITY      G/KG      3.5                         HYDROCARBONS (THC)   G/KM        2.29       (  2.30)
  TEMPERATURE   DEG C    27.8                         CARBON MONOXIDE      G/KM       34.60       ( 34.72)
                                                      OXIDES OF NITROGEN   G/KM        1.83       (  1.80)
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                                       VEHICLE EMISSIONS RESULTS  - RICH BEST IDLE
                                        PROJECT 11-5830-004

TEST NO.   721-2   RUN                      VEHICLE NO.72                 TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.          DATE    10/30/80              ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                  BAG CART NO.  1               GASOLINE  EM-433-F
TRANSMISSION M3                             DYNO NO.      3               ODOMETER 99461. KM(61802. MILES)
                                            CVS NO.   2

BAROMETER 752.35 MM HG(29.62 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  21. PCT                  ABS. HUMIDITY  4.1 GM/KG      NOX HUMIDITY CORRECTION FACTOR   .82
BAG RESULTS
  TEST CYCLE                                     SET              HFET

  BLOWER DIF P MM. H2O(IN. H2O)             762.0 (30.0)     762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)           749.3 (29.5)     749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)     43.3 (110.0)
  BLOWER REVOLUTIONS                           111888.          61304.
  TOT FLOW STD. CU. METRES(SCF)             213.4 ( 7535.)   116.8 ( 4124.)
  HC  SAMPLE METER/RANGE/PPM                23.2/ 3/ 232.    19.3/ 3/ 193.
  HC  BCKGRD METER/RANGE/PPM                 1.2/ 3/  12.     1.6/ 3/  16.
  CO  SAMPLE METER/RANGE/PPM                43.4/ 3/1044.    94.4/11/ 481.
  CO  BCKGRD METER/RANGE/PPM                  .3/ 3/   7.      .8/11/   2.
  CO2 SAMPLE METER/RANGE/PCT                66.0/ 3/ 1.18    83.6/ 3/ 1.54
  CO2 BCKGRD METER/RANGE/PCT                 4.0/ 3/  .06     3.8/ 3/  .06
  NOX SAMPLE METER/RANGE/PPM                55.3/ 3/ 166.    79.5/ 3/ 239.
  NOX BCKGRD METER/RANGE/PPM                  .5/ 3/   2.      .6/ 3/   2.
  DILUTION FACTOR                               10.23            8.32
  HC  CONCENTRATION PPM                         221.             179.
  CO  CONCENTRATION PPM                        1007.             462.
  CO2 CONCENTRATION PCT                         1.13             1.49
  NOX CONCENTRATION PPM                        164.5            236.9
  HC  MASS GRAMS                                27.22            12.05
  CO  MASS GRAMS                               250.19            62.78
  CO2 MASS GRAMS                               4406.1           3192.9
  NOX MASS GRAMS                                55.13            43.18
  RUN TIME             SECONDS                  1396.             765.
       DFC, WET (DRY)                       .902 ( .896)     .880 ( .874)
       SCF, WET (DRY)                      1.000 ( .982)    1.000 ( .980)
       VOL (SCM)                                213.4            116.8
       SAM BLR (SCM)                             0.00             0.00
       KM  (MEASURED)                           21.69            16.37

  TEST NUMBER,                                 721-22           721-23
  BAROMETER,            MM HG                   752.3            751.6
  HUMIDITY,             G/KG                      4.1              3.9
  TEMPERATURE,          DEG C                    25.0             25.6
   CARBON DIOXIDE,       G/KM                   203.2            195.1
  FUEL CONSUMPTION,     L/100KM                  9.61             8.68

  HYDROCARBONS,         G/KM                     1.25              .74
  CARBON MONOXIDE,      G/KM                    11.54             3.84
  OXIDES OF NITROGEN,   G/KM                     2.54             2.64
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TABLE D-10. TEST 721 EMISSIONS RESULTS

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                          FTP    VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                                  PROJECT 11-5830-004

TEST NO.   721-3    RUN   1                    VEHICLE NO.72                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.             DATE   11/ 3/80                      ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                     BAG CART NO.  1                      GASOLINE  EM-433-F
TRANSMISSION A3                                DYNO NO.      3                      ODOMETER 99523. KM(61844. MILES)
                                               CVS NO.   2

BAROMETER 743.71 MM HG(29.28 IN HG)            DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  47. PCT                     ABS. HUMIDITY 10.1 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
  BAG NUMBER                                          1                  2                  3                  4
  DESCRIPTION                                  COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)                762.0 (30.0)       762.0 (30.0)       762.0 (30.0)       762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)              746.8 (29.4)       749.3 (29.5)       749.3 (29.5)       736.6 (29.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)             43.9 (111.0)       43.6 (110.5)       43.6 (110.5)       43.6 (110.5)
  BLOWER REVOLUTIONS                              40530.             69634.             40511.             69590.
  TOT FLOW STD. CU. METRES(SCF)                 76.3 ( 2694.)     131.1 ( 4629.)      76.3 ( 2693.)     131.2 ( 4632.)
  HC  SAMPLE METER/RANGE/PPM                   38.2/ 3/ 382.      21.3/ 3/ 213.      20.1/ 3/ 201.      21.4/ 3/ 214.
  HC  BCKGRD METER/RANGE/PPM                    1.3/ 3/  13.       1.3/ 3/  13.       1.6/ 3/  16.       1.5/ 3/  15.
  CO  SAMPLE METER/RANGE/PPM                   66.8/ 2/3542.      63.1/ 3/1604.      69.5/ 3/1805.      63.6/ 3/1620.
  CO  BCKGRD METER/RANGE/PPM                     .2/ 2/   8.        .2/ 3/   5.        .4/ 3/   9.        .2/ 3/   5.
  CO2 SAMPLE METER/RANGE/PCT                   61.2/ 3/ 1.09      39.0/ 3/  .66      56.4/ 3/  .99      39.2/ 3/  .66
  CO2 BCKGRD METER/RANGE/PCT                    3.5/ 3/  .05       3.3/ 3/  .05       3.9/ 3/  .06       4.3/ 3/  .07
  NOX SAMPLE METER/RANGE/PPM                   73.5/ 2/  74.      42.1/ 2/  42.      88.0/ 2/  88.      42.1/ 2/  42.
  NOX BCKGRD METER/RANGE/PPM                    1.2/ 2/   1.       1.2/ 2/   1.       1.1/ 2/   1.       1.1/ 2/   1.
  DILUTION FACTOR                                  9.14              16.02              11.22              15.92
  HC  CONCENTRATION PPM                          370.               201.               266.               200.
  CO  CONCENTRATION PPM                         3407.              1556.              1736.              1570.
  CO2 CONCENTRATION PCT                           1.04               .61                .94                .60
  NOX CONCENTRATION PPM                          72.4               41.0               87.0               41.1
  HC  MASS GRAMS                                 16.29              15.18              11.72              15.12
  CO  MASS GRAMS                                302.59             237.39             154.09             239.82
  CO2 MASS GRAMS                               1451.2             1468.3             1308.6             1443.4
  NOX MASS GRAMS                                 10.36              10.07              12.44              10.10

  HC  GRAMS/KM                                    2.82               2.42               2.01               2.39
  CO  GRAMS/KM                                   52.34              37.83              26.38              37.96
  CO2 GRAMS/KM                                  251.0              234.0              224.1              228.4
  NOX GRAMS/KM                                    1.79               1.61               2.13               1.60
  FUEL CONSUMPTION BY CB L/100KM                 14.61              12.85              11.60              12.62

  RUN TIME              SECONDS                 505.               868.               505.               868.
  MEASURED DISTANCE     KM                        5.78               6.20               5.84               6.32
       DFC, WET (DRY)                                   .920 ( .906)                          .928 ( .913)
       SCF, WET (DRY)                                  1.000 ( .977)                         1.000 ( .978)
       VOL (SCM)                                          207.4                                 207.4
       SAM BLR (SCM)                                       0.00                                  0.00
       KM  (MEASURED)                                     12.06                                 12.16
       FUEL CONSUMPTION L/100KM                           13.69                                 12.13

COMPOSITE RESULTS                                                                                   3-BAG     (4-BAG)
  TEST NUMBER          721-31                                       CARBON DIOXIDE       G/KM       234.8    ( 233.1)
  BAROMETER    MM HG   743.7                                        FUEL CONSUMPTION     L/100KM     12.87   ( 12.80)
  HUMIDITY     G/KG     10.1                                        HYDROCARBONS (THC)   G/KM         2.39   (  2.38)
  TEMPERATURE  DEG C    26.1                                        CARBON MONOXIDE      G/KM        37.68   ( 37.73)
                                                                    OXIDES OF NITROGEN   G/KM         1.79   (  1.79)
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                                 VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                                  PROJECT 11-5830-004

TEST NO.   721-3    RUN   1                    VEHICLE NO.72                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.             DATE   11/ 3/80                      ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                     BAG CART NO.  1                      GASOLINE  EM-433-F
TRANSMISSION A3                                DYNO NO.      3                      ODOMETER 99551. KM(61858. MILES)
                                               CVS NO.   2

BAROMETER 742.95 MM HG(29.25 IN HG)            DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  44. PCT                     ABS. HUMIDITY  9.4 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .96
BAG RESULTS
  TEST CYCLE                                      SET                 HFET

  BLOWER DIF P MM. H2O(IN. H2O)                742.0 (30.0)        774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)              749.3 (29.5)        756.9 (29.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)             43.6 (110.5)        43.9 (111.0)
  BLOWER REVOLUTIONS                             111987.              61347.
  TOT FLOW STD. CU. METRES(SCF)                210.6 ( 7435.)      115.0 ( 4060.)
  HC  SAMPLE METER/RANGE/PPM                   23.5/ 3/ 235.       20.5/ 3/ 205.
  HC  BCKGRD METER/RANGE/PPM                    1.5/ 3/  15.        1.6/ 3/  16.
  CO  SAMPLE METER/RANGE/PPM                   48.1/ 3/1171.       26.3/ 3/ 611.
  CO  BCKGRD METER/RANGE/PPM                     .1/ 3/   2.         .1/ 3/   2.
  CO2 SAMPLE METER/RANGE/PCT                   66.9/ 3/ 1.20       86.8/ 3/ 1.61
  CO2 BCKGRD METER/RANGE/PCT                    4.4/ 3/  .07        4.3/ 3/  .07
  NOX SAMPLE METER/RANGE/PPM                   50.4/ 3/ 151.       78.4/ 3/ 235.
  NOX BCKGRD METER/RANGE/PPM                     .4/ 3/   1.         .3/ 3/   1.
  DILUTION FACTOR                                 10.02                7.93
  HC  CONCENTRATION PPM                          221.                191.
  CO  CONCENTRATION PPM                         1125.                582.
  CO2 CONCENTRATION PCT                           1.14                1.55
  NOX CONCENTRATION PPM                          150.1               234.4
  HC  MASS GRAMS                                 26.89               12.66
  CO  MASS GRAMS                                275.79               77.89
  CO2 MASS GRAMS                               4396.5              3270.1
  NOX MASS GRAMS                                 57.99               47.77
  RUN TIME              SECONDS                 1397.                765.
       DFC, WET (DRY)                          .900 ( .887)        .874 ( .863)
       SCF, WET (DRY)                         1.000 ( .975)       1.000 ( .972)
       VOL (SCM)                                 210.6               115.0
       SAM BLR (SCM)                               0.00                0.00
       KM  (MEASURED)                             21.82               16.56

  TEST NUMBER,                                  721-32              721-33
  BAROMETER,            MM HG                   743.0               741.9
  HUMIDITY,             G/KG                      9.4                 8.3
  TEMPERATURE,          DEG C                    26.1                25.6
   CARBON DIOXIDE,       G/KM                   201.5               197.5
  FUEL CONSUMPTION,     L/100KM                   9.61                8.85

  HYDROCARBONS,         G/KM                      1.23                 .76
  CARBON MONOXIDE,      G/KM                     12.64                4.70
  OXIDES OF NITROGEN,   G/KM                      2.66                2.88
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TABLE D-11. TEST 722 EMISSIONS RESULTS

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                          FTP    VEHICLE EMISSIONS RESULTS  - UNMODIFIED
                                  PROJECT 11-5830-004

TEST NO.   722-1    RUN   1                 VEHICLE NO.72                    TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.          DATE   10/10/80                  ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) -6                   BAG CART NO.  1                  GASOLINE  EM-433-F
TRANSMISSION                                DYNO NO.      3                  ODOMETER 93907. KM(61458. MILES)
                                            CVS NO.   2

BAROMETER 743.46 MM HG(29.27 IN HG)         DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  53. PCT                  ABS. HUMIDITY 11.1 GM/KG         NOX HUMIDITY CORRECTION FACTOR  1.01
BAG RESULTS
  BAG NUMBER                                     1                 2                 3                 4
  DESCRIPTION                               COLD TRANSIENT     STABILIZED       HOT TRANSIENT      STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             749.3 (29.5)     762.0 (30.0)     749.3 (29.5)     762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)           736.6 (29.0)     736.6 (29.0)     723.9 (28.5)     736.6 (29.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)          42.2 (108.0)     41.7 (107.0)     43.9 (111.0)     42.8 (109.0)
  BLOWER REVOLUTIONS                           40591.           69558.           40505.           69538.
  TOT FLOW STD. CU. METRES(SCF)              76.7 ( 2709.)   131.5 ( 4644.)    76.4 ( 2699.)   131.2 ( 4633.)
  HC  SAMPLE METER/RANGE/PPM                37.0/ 3/ 370.    14.9/ 3/ 149.    22.1/ 3/ 221.    13.9/ 3/ 139.
  HC  BCKGRD METER/RANGE/PPM                 1.4/ 3/  14.     1.3/ 3/  13.     1.3/ 3/  13.     1.3/ 3/  13.
  CO  SAMPLE METER/RANGE/PPM                61.0/ 2/3119.    27.0/ 3/ 628.    46.0/ 3/1114.    25.0/ 3/ 579.
  CO  BCKGRD METER/RANGE/PPM                  .5/ 2/  19.      .9/ 3/  20.      .5/ 3/  11.      .6/ 3/  14.
  CO2 SAMPLE METER/RANGE/PCT                65.0/ 3/ 1.18    44.6/ 3/  .74    58.9/ 3/ 1.04    42.8/ 3/  .73
  CO2 BCKGRD METER/RANGE/PCT                 3.4/ 3/  .05     3.6/ 3/  .06     3.7/ 3/  .06     3.9/ 3/  .06
  NOX SAMPLE METER/RANGE/PPM                87.3/ 2/  87.    46.7/ 2/  47.    92.9/ 2/  93.    43.8/ 2/  44.
  NOX BCKGRD METER/RANGE/PPM                 1.4/ 2/   1.     1.2/ 2/   1.      .8/ 2/   1.      .9/ 2/   1.
  DILUTION FACTOR                              8.04            15.96            11.45            16.75
  HC  CONCENTRATION PPM                        358.             137.             209.             127.
  CO  CONCENTRATION PPM                       2979.             589.            1062.             549.
  CO2 CONCENTRATION PCT                        1.13              .71              .99              .67
  NOX CONCENTRATION PPM                        86.1             45.6             92.2             43.0
  HC  MASS GRAMS                              15.82            10.38             9.22             9.59
  CO  MASS GRAMS                             266.01            90.19            94.49            83.82
  CO2 MASS GRAMS                             1591.1           1715.1           1384.4           1618.7
  NOX MASS GRAMS                              12.78            11.61            13.64            10.91

  HC  GRAMS/KM                                 2.66             1.62             1.56             1.49
  CO  GRAMS/KM                                44.68            14.11            15.96            13.06
  CO2 GRAMS/KM                                267.2            268.4            233.8            252.3
  NOX GRAMS/KM                                 2.15             1.82             2.30             1.70
  FUEL CONSUMPTION BY CB L/100KM              14.76            12.62            11.26            11.85

  RUN TIME            SECONDS                  506.             867.             505.             867.
  MEASURED DISTANCE   KM                       5.95             6.39             5.92             6.42
       DFC, WET (DRY)                              .919 ( .903)                       .930 ( .914)
       SCF, WET (DRY)                             1.000 ( .974)                      1.000 ( .975)
       VOL (SCM)                                        208.2                              207.7
       SAM BLR (SCM)                                     0.00                               0.00
       KM  (MEASURED)                                   12.34                              12.34
       FUEL CONSUMPTION L/100KM                         13.64                              11.57

COMPOSITE RESULTS                                                                            3-BAG      (4-BAG)
   TEST NUMBER          722-1                             CARBON DIOXIDE      G/KM           258.7     ( 253.9)
   BAROMETER     MM HG  743.5                             FUEL CONSUMPTION    L/100KM        12.69     ( 12.46)
   HUMIDITY      G/KG    11.1                             HYDROCARBONS (THC)  G/KM            1.82     (  1.78)
   TEMPERATURE   DEG C   25.6                             CARBON MONOXIDE     G/KM           20.96     ( 20.63)
                                                          OXIDES OF NITROGEN  G/KM            2.02     (  1.98)
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                                  VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                   PROJECT 11-5830-004

TEST NO.   722-1    RUN   1                 VEHICLE NO.72                    TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.          DATE   10/10/80                  ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) -6                   BAG CART NO.  1                  GASOLINE  EM-433-F
TRANSMISSION                                DYNO NO.      3                  ODOMETER 98931. KM(61473. MILES)
                                            CVS NO.   2

BAROMETER 743.46 MM HG(29.27 IN HG)         DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  50. PCT                  ABS. HUMIDITY 10.4 GM/KG         NOX HUMIDITY CORRECTION FACYOR   .99
BAG RESULTS
  TEST CYCLE                                     SET               HFET

  BLOWER DIF P MM. H2O(IN. H2O)             749.3 (29.5)      749.3 (29.5)
  BLOWER INLET P MM. H2O(IN. H2O)           736.6 (29.0)      731.5 (28.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)          41.7 (107.0)      43.9 (111.0)
  BLOWER REVOLUTIONS                          112676.            61414.
  TOT FLOW STD. CU. METRES(SCF)             213.2 ( 7526.)    115.8 ( 4088.)
  HC  SAMPLE METER/RANGE/PPM                17.1/ 3/ 171.     19.4/ 3/ 194.
  HC  BCKGRD METER/RANGE/PPM                 1.4/ 3/  14.      1.5/ 3/  15.
  CO  SAMPLE METER/RANGE/PPM                27.4/ 3/ 637.     92.7/11/ 465.
  CO  BCKGRD METER/RANGE/PPM                  .1/ 3/   2.      1.5/11/   4.
  CO2 SAMPLE METER/RANGE/PCT                66.7/ 3/ 1.20     83.2/ 3/ 1.54
  CO2 BCKGRD METER/RANGE/PCT                 4.1/ 3/  .06      3.9/ 3/  .06
  NOX SAMPLE METER/RANGE/PPM                44.3/ 3/ 133.     69.1/ 3/ 207.
  NOX BCKGRD METER/RANGE/PPM                  .5/ 3/   2.       .6/ 3/   2.
  DILUTION FACTOR                             10.50              8.37
  HC  CONCENTRATION PPM                       158.               181.
  CO  CONCENTRATION PPM                       611.               441.
  CO2 CONCENTRATION PCT                       1.14               1.48
  NOX CONCENTRATION PPM                      131.5              205.7
  HC  MASS GRAMS                             17.46              12.07
  CO  MASS GRAMS                            151.50              59.48
  CO2 MASS GRAMS                            4449.9             3144.7
  NOX MASS GRAMS                             53.01              43.68
  RUN TIME            SECONDS                1405.               766.
       DFC, WET (DRY)                     .905 ( .890)       .881 ( .868)
       SCF, WET (DRY)                    1.000 ( .973)      1.000 ( .972)
       VOL (SCM)                             213.2              115.8
       SAM BLR (SCM)                          0.00               0.00
       KM  (MEASURED)                        21.97              16.62

  TEST NUMBER,                               722-1              722-1
  BAROMETER,            MM HG                743.5              743.5
  HUMIDITY,             G/KG                  10.4                9.4
  TEMPERATURE,          DEG C                 25.6               26.1
   CARBON DIOXIDE,       G/KM                202.6              189.2
  FUEL CONSUMPTION,     L/100KM               9.23               8.42

  HYDROCARBONS,         G/KM                   .89                .73
  CARBON MONOXIDE,      G/KM                  6.90               3.58
  OXIDES OF NITROGEN,   G/KM                  2.41               2.63
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TABLE D-12. TEST 722 EMISSIONS RESULTS

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                                FTP   VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE
                                       PROJECT 11-5830-004
                                                                       TEST WEIGHT  1588. KG( 3500. LBS)
                                       VEHICLE NO.72                   ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
TEST NO.   722-2    RUN   1            DATE   10/15/80                 GASOLINE  EM-433-F
VEHICLE MODEL    70 DODGE CHALLENG.    BAG CART NO.  1                 ODOMETER 99029. KM(61534. MILES)
ENGINE 3.7 L(225. CID) I-6             DYNO NO.      3
TRANSMISSION M3                        CVS NO.   2

BAROMETER 738.12 MM HG(29.06 IN HG)    DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)   NOX HUMIDITY CORRECTION FACTOR  1.03
RELATIVE HUMIDITY  39. PCT             ABS. HUMIDITY 11.7 GM/KG
BAG RESULTS
   BAG NUMBER                              1                 2                 3                 4
   DESCRIPTION                       COLD TRANSIENT      STABILIZED      HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)       756.9 (29.8)      734.9 (29.8)      741.7 (29.2)      749.3 (29.5)
   BLOWER INLET P MM. H2O(IN. H2O)     734.4 (29.0)      734.6 (29.0)      723.9 (28.5)      736.6 (29.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)    43.3 (110.0)      43.1 (109.5)      43.6 (110.5)      42.5 (108.5)
   BLOWER REVOLUTIONS                    40546.            69648.            40404.            69585.
   TOT FLOW STD. CU. METRES(SCF)        75.9 ( 2678.)    130.4 ( 4603.)     75.9 ( 2678.)    130.4 ( 4604.)
   HC  SAMPLE METER/RANGE/PPM         15.1/ 4/1510.     83.5/ 3/ 835.     12.2/ 4/1220.     85.5/ 3/ 855.
   HC  BCKGRD METER/RANGE/PPM           .1/ 4/  10.      2.0/ 3/  20.       .2/ 4/  20.      2.0/ 3/  20.
   CO  SAMPLE METER/RANGE/PPM         62.6/ 2/3233.     31.4/ 3/ 734.     55.1/ 3/1347.     29.9/ 3/ 699.
   CO  BCKGRD METER/RANGE/PPM           .3/ 2/  11.       .2/ 3/   5.       .1/ 3/   2.       .1/ 3/   2.
   CO2 SAMPLE METER/RANGE/PCT         42.7/ 3/ 1.12     42.3/ 3/  .72     50.4/ 3/ 1.03     42.0/ 3/  .72
   CO2 BCKGRD METER/RANGE/PCT          4.2/ 3/  .06      4.2/ 3/  .06      4.1/ 3/  .06      4.0/ 3/  .06
   NOX SAMPLE METER/RANGE/PPM         73.6/ 2/  76.     47.3/ 2/  47.     32.5/ 3/  98.     48.1/ 3/ 144.
   NOX BCKGRD METER/RANGE/PPM          2.0/ 2/   2.      1.8/ 2/   2.       .4/ 3/   1.      1.1/ 2/   1.
   DILUTION FACTOR                        8.49             15.31             10.43             15.44
   HC  CONCENTRATION PPM                 1501.              816.             1202.              836.
   CO  CONCENTRATION PPM                 3092.              707.             1312.              674.
   CO2 CONCENTRATION PCT                 1.06               .66               .97               .66
   NOX CONCENTRATION PPM                 73.8              45.4              96.4             143.3
   HC  MASS GRAMS                       45.66             61.36             52.57             62.88
   CO  MASS GRAMS                      273.04            107.36            115.84            102.27
   CO2 MASS GRAMS                      1472.0            1576.1            1353.0            1570.0
   NOX MASS GRAMS                       11.06             11.74             14.44             36.89

   HC  GRAMS/KM                         11.22              9.74              9.07              9.98
   CO  GRAMS/KM                         46.65             17.04             19.99             16.23
   CO2 GRAMS/KM                         251.5             250.2             233.4             249.1
   NOX GRAMS/KM                          1.89              1.86              2.49              5.85
   FUEL CONSUMPTION BY CB L/100KM       15.38             13.14             12.53             13.07

   RUN TIME               SECONDS        505.              840.              304.              867.
   MEASURED DISTANCE      KM             5.85              6.30              5.80              6.30
        DFC, WET (DRY)                        .915 ( .898)                        .924 ( .906)
        SCF, WET (DRY)                       1.000 ( .973)                       1.000 ( .973)
        VOL (SCM)                                   206.2                               206.3
        SAM BLR (SCM)                                0.00                                0.00
        KM  (MEASURED)                              12.15                               12.10
        FUEL CONSUMPTION L/100KM                    14.22                               12.81

                                                                                       3-BAG      (4-BAG)
COMPOSITE RESULTS                                          CARBON DIOXIDE      G/KM    245.9     ( 245.6)
   TEST NUMBER            722-21                           FUEL CONSUMPTION    L/100KM  13.44    ( 13.42)
   BAROMETER      MM HG   738.1                            HYDROCARBONS (THC)  G/KM      9.86    (  9.93)
   HUMIDITY       G/KG     11.7                            CARBON MONOXIDE     G/KM     23.98    ( 23.74)
   TEMPERATURE    DEG C    24.4                            OXIDES OF NITROGEN  G/KM      2.04    (  3.23)
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                                      VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE
                                       PROJECT 11-5830-004
                                                                       TEST WEIGHT  1588. KG( 3500. LBS)
                                       VEHICLE NO.72                   ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
TEST NO.   722-2    RUN   2            DATE   10/17/80                 GASOLINE  EM-433-F
VEHICLE MODEL    70 DODGE CHALLENG     BAG CART NO.  1                 ODOMETER 99134. KM(61599. MILES)
ENGINE 3.7 L(225. CID) I-6             DYNO NO.      3
TRANSMISSION M3                        CVS NO.   2

BAROMETER 736.35 MM HG(28.99 IN HG)    DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)   NOX HUMIDITY CORRECTION FACTOR  1.05
RELATIVE HUMIDITY  54. PCT             ABS. HUMIDITY 12.2 GM/KG
BAG RESULTS
   TEST CYCLE                               SET                HFET

   BLOWER DIF P MM. H2O(IN. H2O)       749.3 (29.5)       762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)     736.6 (29.0)       749.3 (29.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)    37.8 (100.0)       40.6 (105.0)
   BLOWER REVOLUTIONS                   112107.             61391.
   TOT FLOW STD. CU. METRES(SCF)       211.4 ( 7466.)     114.9 ( 4059.)
   HC  SAMPLE METER/RANGE/PPM         12.9/ 4/1290.      17.0/ 4/1700.
   HC  BCKGRD METER/RANGE/PPM           .1/ 4/  10.        .2/ 4/  20.
   CO  SAMPLE METER/RANGE/PPM         32.1/ 3/ 753.      26.1/ 3/ 606.
   CO  BCKGRD METER/RANGE/PPM           .5/ 3/  11.        .3/ 3/   7.
   CO2 SAMPLE METER/RANGE/PCT         64.5/ 3/ 1.15      85.3/ 3/ 1.58
   CO2 BCKGRD METER/RANGE/PCT          3.9/ 3/  .06       4.1/ 3/  .06
   NOX SAMPLE METER/RANGE/PPM         44.4/ 3/ 133.      75.4/ 3/ 226.
   NOX BCKGRD METER/RANGE/PPM           .5/ 3/   2.        .6/ 3/   2.
   DILUTION FACTOR                        9.89               7.41
   HC  CONCENTRATION PPM                 1281.              1683.
   CO  CONCENTRATION PPM                  713.               571.
   CO2 CONCENTRATION PCT                 1.10               1.53
   NOX CONCENTRATION PPM                131.9              224.6
   HC  MASS GRAMS                      156.17             111.52
   CO  MASS GRAMS                      175.60              76.46
   CO2 MASS GRAMS                      4254.6             3210.2
   NOX MASS GRAMS                       56.14              49.41
   RUN TIME               SECONDS       1397.               765.
        DFC, WET (DRY)                  .899 ( .883)       .865 ( .850)
        SCF, WET (DRY)                 1.000 ( .972)      1.000 ( .958)
        VOL (SCM)                           211.4              114.9
        SAM BLR (SCM)                        0.00               0.00
        KM  (MEASURED)                      21.53              16.38

    TEST NUMBER,                           722-22             722-23
    BAROMETER,             MM HG            736.3              736.3
    HUMIDITY,              G/KG              12.2               10.7
    TEMPERATURE,           DEG C             26.7               25.0
     CARBON DIOXIDE,        G/KM            197.6              196.0
    FUEL CONSUMPTION,      L/100KM           9.96               9.60

    HYDROCARBONS,          G/KM              7.25               6.81
    CARBON MONOXIDE,       G/KM              8.16               4.67
    OXIDES OF NITROGEN,    G/KM              2.61               3.02
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TABLE D-13. TEST 722 EMISSIONS RESULTS

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                            FTP   VEHICLE EMISSIONS RESULTS  - 12 PERCENT MISFIRE
                                   PROJECT 11-5830-004

TEST NO.   722-3    RUN   1                 VEHICLE NO.72                        TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    70 DODGE CHALLENG.         DATE   10/20/80                      ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                  BAG CART NO.  1                      GASOLINE  EM-433-F
TRANSMISSION M3                             DYNO NO.      3                      ODOMETER 99197. KM(61633. MILES)
                                            CVS NO.   2

BAROMETER 746.25 MM HG(29.38 IN HG)         DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  45. PCT                  ABS. HUMIDITY  8.7 GM/KG              NOX HUMIDITY CORRECTION FACTOR   .94
BAG RESULTS
  BAG NUMBER                                      1                 2                 3                 4
  DESCRIPTION                               COLD TRANSIENT      STABILIZED       HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             762.0 (30.0)      762.0 (30.0)      749.3 (29.5)      756.9 (29.8)
  BLOWER INLET P MM. H2O(IN. H2O)           736.6 (29.0)      741.7 (29.2)      731.5 (28.8)      736.6 (29.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)          42.8 (109.0)      40.6 (105.0)      42.5 (108.5)      42.2 (108.0)
  BLOWER REVOLUTIONS                           40572.            69588.            40513.            69583.
  TOT FLOW STD. CU. METRES(SCF)              76.9 ( 2715.)    132.3 ( 4673.)     76.9 ( 2715.)    132.0 ( 4661.)
  HC   SAMPLE METER/RANGE/PPM               13.8/ 4/1380.     79.9/ 3/ 799.     11.2/ 4/1120.     83.5/ 3/ 835.
  HC   BCKGRD METER/RANGE/PPM                 .2/ 4/  20.      1.9/ 3/  19.       .2/ 4/  20.      1.9/ 3/  19.
  CO   SAMPLE METER/RANGE/PPM               95.0/ 3/2732.     25.0/ 3/ 579.     47.7/ 3/1160.     26.6/ 3/ 618.
  CO   BCKGRD METER/RANGE/PPM                 .5/ 3/  11.       .2/ 3/   5.       .4/ 3/   9.       .5/ 3/  11.
  CO2  SAMPLE METER/RANGE/PCT               60.2/ 3/ 1.07     41.1/ 3/  .70     55.9/ 3/  .98     40.1/ 3/  .68
  CO2  BCKGRD METER/RANGE/PCT                3.9/ 3/  .06      3.9/ 3/  .06      3.7/ 3/  .06      3.9/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM               85.6/ 2/  86.     52.5/ 2/  53.     35.1/ 3/ 105.     51.0/ 2/  51.
  NOX  BCKGRD METER/RANGE/PPM                1.8/ 2/   2.      1.6/ 2/   2.       .3/ 3/   1.      1.1/ 2/   1.
  DILUTION FACTOR                               9.12             16.06             11.11             16.28
  HC   CONCENTRATION PPM                       1362.              781.             1102.              817.
  CO   CONCENTRATION PPM                       2624.              559.             1113.              591.
  CO2  CONCENTRATION PCT                       1.01               .64               .93               .62
  NOX  CONCENTRATION PPM                       84.0              51.0             104.5              50.0
  HC   MASS GRAMS                             60.39             59.61             48.84             62.20
  CO   MASS GRAMS                            235.07             86.10             99.61             90.75
  CO2  MASS GRAMS                            1426.8            1555.6            1309.5            1506.7
  NOX  MASS GRAMS                             11.59             12.11             14.42             11.84

  HC   GRAMS/KM                               10.45              9.57              8.36              9.86
  CO   GRAMS/KM                               40.68             13.82             17.05             14.39
  CO2  GRAMS/KM                               246.9             249.7             224.1             238.9
  NOX  GRAMS/KM                                2.01              1.94              2.47              1.88
  FUEL CONSUMPTION BY CB L/100KM              14.68             12.88             11.84             12.50

  RUN TIME               SECONDS               505.              867.              505.              867.
  MEASURED DISTANCE      KM                    5.78              6.23              5.84              6.31
        DFC, WET (DRY)                             .920 ( .907)                       .928 ( .915)
        SCF, WET (DRY)                            1.000 ( .978)                      1.000 ( .978)
        VOL (SCM)                                        209.2                              208.9
        SAM BLR (SCM)                                     0.00                               0.00
        KM  (MEASURED)                                   12.01                              12.15
        FUEL CONSUMPTION L/100KM                         13.75                              12.18

COMPOSITE RESULTS                                                                         3-BAG      (4-BAG)
  TEST NUMBER          722-31                                CARBON DIOXIDE        G/KM    242.0     ( 238.9)
  BAROMETER    MM HG   746.3                                 FUEL CONSUMPTION    L/100KM   12.97     ( 12.85)
  HUMIDITY     G/KG      8.7                                 HYDROCARBONS (THC)    G/KM     9.42     (  9.51)
  TEMPERATURE  DEG C    24.4                                 CARBON MONOXIDE       G/KM    20.27     ( 20.43)
                                                             OXIDES OF NITROGEN    G/KM     2.10     (  2.08)
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                                  VEHICLE EMISSIONS RESULTS  - 12 PERCENT MISFIRE
                                    PROJECT 11-5830-004

TEST NO.   722-3    RUN   1                 VEHICLE NO.72                       TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL    70 DODGE CHALLENG.         DATE   10/20/80                     ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                  BAG CART NO.  1                     GASOLINE  EM-433-F
TRANSMISSION M3                             DYNO NO.      3                     ODOMETER 99219. KM(61652. MILES)
                                            CVS NO.   2

BAROMETER 746.76 MM HG(29.40 IN HG)         DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  42. PCT                  ABS. HUMIDITY  8.1 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .92
BAG RESULTS
  TEST CYCLE                                     SET               HFET

  BLOWER DIF P MM. H2O(IN. H2O)             762.0 (30.0)      767.1 (30.2)
  BLOWER INLET P MM. H2O(IN. H2O)           749.3 (29.5)      749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)      43.6 (110.5)
  BLOWER REVOLUTIONS                          112098.            61412.
  TOT FLOW STD. CU. METRES(SCF)             212.1 ( 7488.)    116.1 ( 4098.)
  HC   SAMPLE METER/RANGE/PPM               12.7/ 4/1270.     16.5/ 4/1650.
  HC   BCKGRD METER/RANGE/PPM                 .1/ 4/  10.       .2/ 4/  20.
  CO   SAMPLE METER/RANGE/PPM               28.6/ 3/ 667.     92.9/11/ 467.
  CO   BCKGRD METER/RANGE/PPM                 .3/ 3/   7.      1.7/11/   5.
  CO2  SAMPLE METER/RANGE/PCT               65.2/ 3/ 1.17     82.6/ 3/ 1.52
  CO2  BCKGRD METER/RANGE/PCT                3.9/ 3/  .06      4.0/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM               53.0/ 3/ 159.     83.8/ 3/ 251.
  NOX  BCKGRD METER/RANGE/PPM                 .3/ 3/   1.       .4/ 3/   1.
  DILUTION FACTOR                               9.87              7.73
  HC   CONCENTRATION PPM                       1261.             1633.
  CO   CONCENTRATION PPM                        637.              443.
  CO2  CONCENTRATION PCT                       1.11              1.47
  NOX  CONCENTRATION PPM                      158.2             250.4
  HC   MASS GRAMS                            154.20            109.26
  CO   MASS GRAMS                            157.23             59.84
  CO2  MASS GRAMS                            4322.2            3124.1
  NOX  MASS GRAMS                             58.99             51.76
  RUN TIME               SECONDS               1398.              766.
       DFC, WET (DRY)                       .899 ( .887)      .871 ( .859)
       SCF, WET (DRY)                      1.000 ( .976)     1.000 ( .972)
       VOL (SCM)                               212.1             116.1
       SAM BLR (SCM)                            0.00              0.00
       KM  (MEASURED)                          21.47             16.33

  TEST NUMBER,                                 722-32            722-33
  BAROMETER,             MM HG                 746.8             746.5
  HUMIDITY,              G/KG                    8.1               8.5
  TEMPERATURE,           DEG C                  24.4              25.0
   CARBON DIOXIDE,        G/KM                 201.3             191.4
  FUEL CONSUMPTION,      L/100KM               10.06              9.32

  HYDROCARBONS,          G/KM                   7.18              6.69
  CARBON MONOXIDE,       G/KM                   7.32              3.67
  OXIDES OF NITROGEN,    G/KM                   2.75              3.17
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TABLE D-14. TEST 723 EMISSIONS RESULTS

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                                   FTP   VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                          PROJECT 11-5830-004

TEST NO.   723-1    RUN   1                 VEHICLE NO.72                 TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.          DATE   11/ 4/80               ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                  BAG CART NO.  1               GASOLINE  EM-433-F
TRANSMISSION M3                             DYNO NO.      3               ODOMETER 99636. KM(61911. MILES)
                                            CVS NO.   2

BAROMETER 748.28 MM HG(29.46 IN HG)         DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  47. PCT                  ABS. HUMIDITY 10.0 GM/KG      NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
   BAG NUMBER                                     1                2                  3                 4
   DESCRIPTION                              COLD TRANSIENT    STABILIZED        HOT TRANSIENT      STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)            767.1 (30.2)      767.1 (30.2)      762.0 (30.0)      762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)          749.3 (29.5)      749.3 (29.5)      741.7 (29.2)      736.6 (29.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)         41.1 (106.0)      41.7 (107.0)      44.2 (111.5)      43.3 (110.0)
   BLOWER REVOLUTIONS                          40516.            69556.            40471.            69509.
   TOT FLOW STD. CU. METRES(SCF)             77.1 ( 2723.)    132.3 ( 4670.)     76.7 ( 2708.)    132.0 ( 4660.)
   HC  SAMPLE METER/RANGE/PPM               33.1/ 3/ 331.     12.2/ 3/ 122.     20.7/ 3/ 207.     11.5/ 3/ 115.
   HC  BCKGRD METER/RANGE/PPM                1.1/ 3/  11.      1.2/ 3/  12.      1.4/ 3/  14.      1.2/ 3/  12.
   CO  SAMPLE METER/RANGE/PPM               90.2/ 3/2865.     82.9/11/ 304.     42.9/ 3/1031.     75.3/11/ 329.
   CO  BCKGRD METER/RANGE/PPM                 .1/ 3/   2.      1.0/11/   3.       .1/ 3/   2.       .7/11/   2.
   CO2 SAMPLE METER/RANGE/PCT               63.3/ 3/ 1.13     43.0/ 3/  .73     58.4/ 3/ 1.03     42.8/ 3/  .73
   CO2 BCKGRD METER/RANGE/PCT                3.1/ 3/  .05      3.5/ 3/  .05      3.2/ 3/  .05      3.4/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM               75.8/ 2/  76.     44.2/ 2/  44.     90.3/ 2/  90.     46.1/ 2/  46.
   NOX BCKGRD METER/RANGE/PPM                 .6/ 2/   1.       .6/ 2/   1.       .9/ 2/   1.       .9/ 2/   1.
   DILUTION FACTOR                              9.32             17.11             11.44             17.32
   HC  CONCENTRATION PPM                        321.              111.              194.              104.
   CO  CONCENTRATION PPM                       2758.              370.              993.              318.
   CO2 CONCENTRATION PCT                        1.09               .68               .99               .68
   NOX CONCENTRATION PPM                        75.3              43.6              89.5              45.3
   HC  MASS GRAMS                              14.28              8.44              8.59              7.89
   CO  MASS GRAMS                             247.58             56.98             83.61             48.83
   CO2 MASS GRAMS                             1534.0            1654.5            1385.0            1645.4
   NOX MASS GRAMS                              10.86             10.79             12.84             11.17

   HC  GRAMS/KM                                 2.44              1.34              1.47              1.25
   CO  GRAMS/KM                                42.26              9.04             15.16              7.74
   CO2 GRAMS/KM                                261.8             262.4             237.0             260.8
   NOX GRAMS/KM                                 1.85              1.71              2.20              1.77
   FUEL CONSUMPTION BY CB L/100KM              14.34             11.99             11.33             11.82

   RUN TIME              SECONDS                505.              867.              505.              867.
   MEASURED DISTANCE     KM                     5.86              6.30              5.84              6.31
         DFC, WET (DRY)                              .924 ( .910)                .932 ( .918)
         SCF, WET (DRY)                             1.000 ( .977)               1.000 ( .977)
         VOL (SCM)                                        209.4                       208.7
         SAM BLR (SCM)                                     0.00                        0.00
         KM  (MEASURED)                                   12.16                       12.15
         FUEL CONSUMPTION L/100KM                         13.12                       11.58

                                                                                              3-BAG      (4-BAG)
COMPOSITE RESULTS                                             CARBON DIOXIDE         G/KM     255.3      ( 254.9)
   TEST NUMBER            723-11                              FUEL CONSUMPTION       L/100KM  12.30      ( 12.25)
   BAROMETER     MM HG   748.3                                HYDROCARBONS (THC)     G/KM      1.60      (  1.58)
   HUMIDITY      G/KG     10.0                                CARBON MONOXIDE        G/KM     17.60      ( 17.21)
   TEMPERATURE   DEG C    26.1                                OXIDES OF NITROGEN     G/KM      1.87      (  1.89)
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                                        VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                         PROJECT 11-5830-004

TEST NO.   723-1    RUN   1                 VEHICLE NO.72                 TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.          DATE   11/ 4/80               ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                  BAG CART NO.  1               GASOLINE  EM-433-F
TRANSMISSION M3                             DYNO NO.      3               ODOMETER 99654. KM(61922. MILES)
                                            CVS NO.   2

BAROMETER 748.28 MM HG(29.46 IN HG)         DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  40. PCT                  ABS. HUMIDITY  8.6 GM/KG      NOX HUMIDITY CORRECTION FACTOR   .94
BAG RESULTS
   TEST CYCLE                                  SET               HFET

   BLOWER DIF P MM. H2O(IN. H2O)            762.0 (30.0)      762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)          746.8 (29.4)      741.7 (29.2)
   BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)      43.3 (110.0)
   BLOWER REVOLUTIONS                         111997.            61340.
   TOT FLOW STD. CU. METRES(SCF)            212.4 ( 7500.)    116.4 ( 4109.)
   HC  SAMPLE METER/RANGE/PPM               16.4/ 3/ 164.     16.6/ 3/ 166.
   HC  BCKGRD METER/RANGE/PPM                1.2/ 3/  12.      1.4/ 3/  14.
   CO  SAMPLE METER/RANGE/PPM               88.7/11/ 431.     81.5/11/ 373.
   CO  BCKGRD METER/RANGE/PPM                 .6/11/   2.       .5/11/   1.
   CO2 SAMPLE METER/RANGE/PCT               68.0/ 3/ 1.22     83.8/ 3/ 1.55
   CO2 BCKGRD METER/RANGE/PCT                3.6/ 3/  .06      3.6/ 3/  .06
   NOX SAMPLE METER/RANGE/PPM               51.6/ 3/ 155.     75.7/ 3/ 227.
   NOX BCKGRD METER/RANGE/PPM                 .4/ 3/   1.       .3/ 3/   1.
   DILUTION FACTOR                             10.46              8.37
   HC  CONCENTRATION PPM                        153.              154.
   CO  CONCENTRATION PPM                        413.              357.
   CO2 CONCENTRATION PCT                        1.17              1.50
   NOX CONCENTRATION PPM                       153.7             226.3
   HC  MASS GRAMS                              18.76             10.31
   CO  MASS GRAMS                             102.18             48.33
   CO2 MASS GRAMS                             4554.0            3195.5
   NOX MASS GRAMS                              58.46             45.87
   RUN TIME              SECONDS               1398.              765.
         DFC, WET (DRY)                     .904 ( .893)      .881 ( .871)
         SCF, WET (DRY)                    1.000 ( .976)     1.000 ( .974)
         VOL (SCM)                             212.4             116.4
         SAM BLR (SCM)                          0.00              0.00
         KM  (MEASURED)                        21.84             16.41

   TEST NUMBER,                                723-12            723-13
   BAROMETER,               MM HG              748.3             748.0
   HUMIDITY,                G/KG                 8.6               7.7
   TEMPERATURE,             DEG C               26.1              26.7
    CARBON DIOXIDE,          G/KM              209.0             194.7
   FUEL CONSUMPTION,        L/100KM             9.35              8.59

   HYDROCARBONS,            G/KM                 .86               .63
   CARBON MONOXIDE,         G/KM                4.68              2.95
   OXIDES OF NITROGEN,      G/KM                2.68              2.80
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TABLE D-15. TEST 723 EMISSIONS RESULTS

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                                  FTP   VEHICLE EMISSIONS RESULTS - LEAN IDLE
                                         PROJECT 11-5830-004

TEST NO.   723-2    RUN   1                    VEHICLE NO.72                         TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.             DATE   11/ 6/80                       ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6                     BAG CART NO.  1                       GASOLINE  EM-433-F
TRANSMISSION M3                                DYNO NO.      3                       ODOMETER 99742. KM(61977. MILES)
                                               CVS NO.   2

BAROMETER 745.49 MM HG(29.35 IN HG)            DRY BULB TEMP. 27.2 DEG C(81.0 DEG F)
RELATIVE HUMIDITY  36. PCT                     ABS. HUMIDITY  8.2 GM/KG              NOX HUMIDITY CORRECTION FACTOR   .92
BAG RESULTS
  BAG NUMBER                                          1                  2                  3                  4
  DESCRIPTION                                  COLD TRANSIENT       STABILIZED       HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)                762.0 (30.0)       762.0 (30.0)       762.0 (30.0)       756.9 (29.8)
  BLOWER INLET P MM. H2O(IN. H2O)              749.3 (29.5)       749.3 (29.5)       741.7 (29.2)       736.6 (29.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)             42.2 (108.0)       42.8 (109.0)       43.3 (110.0)       43.6 (110.5)
  BLOWER REVOLUTIONS                              40547.             69627.             40491.             69529.
  TOT FLOW STD. CU. METRES(SCF)                 76.7 ( 2709.)     131.6 ( 4647.)      76.5 ( 2702.)     131.4 ( 4641.)
  HC   SAMPLE METER/RANGE/PPM                  36.3/ 3/ 363.      31.6/ 3/ 316.      45.1/ 3/ 451.      31.7/ 3/ 317.
  HC   BCKGRD METER/RANGE/PPM                   1.1/ 3/  11.       1.3/ 3/  13.       1.6/ 3/  16.       1.5/ 3/  15.
  CO   SAMPLE METER/RANGE/PPM                  92.5/ 3/2631.      71.8/11/ 306.      39.5/ 3/ 941.      67.6/11/ 280.
  CO   BCKGRD METER/RANGE/PPM                    .1/ 3/   2.       1.1/11/   3.        .1/ 3/   2.       1.0/11/   3.
  CO2  SAMPLE METER/RANGE/PCT                  61.8/ 3/ 1.10      45.2/ 3/  .78      58.9/ 3/ 1.04      45.0/ 3/  .77
  CO2  BCKGRD METER/RANGE/PCT                   3.8/ 3/  .06       4.5/ 3/  .07       4.7/ 3/  .07       4.7/ 3/  .07
  NOX  SAMPLE METER/RANGE/PPM                  72.4/ 2/  72.      44.7/ 2/  45.      92.2/ 2/  92.      44.7/ 2/  45.
  NOX  BCKGRD METER/RANGE/PPM                    .6/ 2/   1.        .9/ 2/   1.       1.0/ 2/   1.       1.0/ 2/   1.
  DILUTION FACTOR                                  9.64              16.01              11.38              16.13
  HC   CONCENTRATION PPM                           353.               304.               436.               303.
  CO   CONCENTRATION PPM                          2542.               295.               910.               270.
  CO2  CONCENTRATION PCT                          1.03                .71                .98                .70
  NOX  CONCENTRATION PPM                          71.9               43.9               91.3               43.8
  HC   MASS GRAMS                                15.62              23.06              19.26              22.96
  CO   MASS GRAMS                               227.09              45.22              81.03              41.30
  CO2  MASS GRAMS                               1470.1             1712.0             1366.3             1693.4
  NOX  MASS GRAMS                                 9.74              10.20              12.34              10.16

  HC   GRAMS/KM                                   2.68               3.66               3.30               3.63
  CO   GRAMS/KM                                  38.98               7.18              13.88               6.53
  CO2  GRAMS/KM                                  252.4              271.9              234.0              267.9
  NOX  GRAMS/KM                                   1.67               1.62               2.11               1.61
  FUEL CONSUMPTION BY CB L/100KM                 13.75              12.50              11.37              12.36

  RUN TIME                 SECONDS               505.               867.               505.               867.
  MEASURED DISTANCE        KM                    5.83               6.30               5.84               6.32
        DFC, WET (DRY)                                   .922 ( .912)                          .928 ( .918)
        SCF, WET (DRY)                                  1.000 ( .980)                         1.000 ( .980)
        VOL (SCM)                                               208.3                                 208.0
        SAM BLR (SCM)                                            0.00                                  0.00
        KM  (MEASURED)                                          12.12                                 12.16
        FUEL CONSUMPTION L/100KM                                13.14                                 11.88

COMPOSITE RESULTS
    TEST NUMBER             723-21
    BAROMETER    MM HG       745.5
    HUMIDITY     G/KG          8.2
    TEMPERATURE  DEG C        27.2
                                                                                        3-BAG        (4-BAG)
                                                   CARBON DIOXIDE          G/KM         257.5       ( 256.3)
                                                   FUEL CONSUMPTION        L/100KM      12.49       ( 12.43)
                                                   HYDROCARBONS (THC)      G/KM          3.36       (  3.35)
                                                   CARBON MONOXIDE         G/KM         15.59       ( 15.39)
                                                   OXIDES OF NITROGEN      G/KM          1.77       (  1.76)
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                                         VEHICLE EMISSIONS RESULTS - LEAN IDLE
                                          PROJECT 11-5830-004

TEST NO.   723-2    RUN   1                    VEHICLE NO.72
VEHICLE MODEL   70 DODGE CHALLENG.             DATE   11/ 6/80                       TEST WEIGHT  1588. KG( 3500. LBS)
ENGINE 3.7 L(225. CID) I-6                     BAG CART NO.  1                       ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
TRANSMISSION M3                                DYNO NO.      3                       GASOLINE  EM-433-F
                                               CVS NO.   2                           ODOMETER 99765. KM(61991. MILES)

BAROMETER 744.47 MM HG(29.31 IN HG)            DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  40. PCT                     ABS. HUMIDITY  8.3 GM/KG              NOX HUMIDITY CORRECTION FACTOR   .93
BAG RESULTS
  TEST CYCLE                                        SET                HFET

  BLOWER DIF P MM. H2O(IN. H2O)                762.0 (30.0)       762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)              736.6 (29.0)       736.6 (29.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)             43.3 (110.0)       43.6 (110.5)
  BLOWER REVOLUTIONS                             112088.             61380.
  TOT FLOW STD. CU. METRES(SCF)                211.6 ( 7473.)     115.7 ( 4087.)
  HC   SAMPLE METER/RANGE/PPM                  27.9/ 3/ 279.      23.7/ 3/ 237.
  HC   BCKGRD METER/RANGE/PPM                   1.3/ 3/  13.       1.7/ 3/  17.
  CO   SAMPLE METER/RANGE/PPM                  95.4/11/ 490.      23.7/ 3/ 548.
  CO   BCKGRD METER/RANGE/PPM                    .7/11/   2.        .1/ 3/   2.
  CO2  SAMPLE METER/RANGE/PCT                  68.2/ 3/ 1.23      84.1/ 3/ 1.55
  CO2  BCKGRD METER/RANGE/PCT                   4.0/ 3/  .06       4.2/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM                  46.2/ 3/ 139.      69.6/ 3/ 209.
  NOX  BCKGRD METER/RANGE/PPM                    .4/ 3/   1.        .5/ 3/   2.
  DILUTION FACTOR                                10.29               8.22
  HC   CONCENTRATION PPM                          267.               222.
  CO   CONCENTRATION PPM                          471.               523.
  CO2  CONCENTRATION PCT                          1.17               1.50
  NOX  CONCENTRATION PPM                         137.5              207.5
  HC   MASS GRAMS                                32.61              14.82
  CO   MASS GRAMS                               115.96              70.50
  CO2  MASS GRAMS                               4541.7             3175.0
  NOX  MASS GRAMS                                51.52              41.69
  RUN TIME                 SECONDS               1398.               765.
        DFC, WET (DRY)                         .903 ( .891)       .878 ( .868)
        SCF, WET (DRY)                        1.000 ( .976)      1.000 ( .974)
        VOL (SCM)                                211.6              115.7
        SAM BLR (SCM)                             0.00               0.00
        KM  (MEASURED)                           21.73              16.40
  TEST NUMBER,                                  723-22             723-23
  BAROMETER,             MM HG                   744.5              744.0
  HUMIDITY,              G/KG                      8.3                7.6
  TEMPERATURE,           DEG C                    25.6               25.6
   CARBON DIOXIDE,        G/KM                   209.0              193.5
  FUEL CONSUMPTION,      L/100KM                  9.48               8.67

  HYDROCARBONS,          G/KM                     1.50                .90
  CARBON MONOXIDE,       G/KM                     5.34               4.30
  OXIDES OF NITROGEN,    G/KM                     2.37               2.34
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TABLE D-16. TEST 723 EMISSIONS RESULTS

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                         FTP    VEHICLE EMISSIONS RESULTS - LEAN IDLE
                                 PROJECT 11-5830-004

TEST NO.   723-3    RUN   1              VEHICLE NO.72               TEST WEIGHT  1588. KG( 3500. LBS)
VEHICLE MODEL   70 DODGE CHALLENG.       DATE   11/ 7/80             ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
ENGINE 3.7 L(225. CID) I-6               BAG CART NO.  1             GASOLINE  EM-433-F
TRANSMISSION M3                          DYNO NO.      3             ODOMETER 99021. KM(62026. MILES)
                                         CVS NO.   2

BAROMETER 739.39 MM HG(29.11 IN HG)      DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  44. PCT               ABS. HUMIDITY 10.0 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
  BAG NUMBER                                   1                  2                  3                  4
  DESCRIPTION                           COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)          756.9 (29.8)       762.0 (30.0)       756.9 (29.8)       762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)        736.6 (29.0)       736.6 (29.0)       736.6 (29.0)       741.7 (29.2)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.9 (111.0)       43.3 (110.0)       43.3 (110.0)       43.3 (110.0)
  BLOWER REVOLUTIONS                        40577.             69652.             40519.             69604.
  TOT FLOW STD. CU. METRES(SCF)          76.0 ( 2683.)     130.5 ( 4609.)      75.9 ( 2682.)     130.4 ( 4603.)
  HC   SAMPLE METER/RANGE/PPM           36.9/ 3/ 369.      27.8/ 3/ 278.      45.2/ 3/ 452.      32.6/ 3/ 326.
  HC   BCKGRD METER/RANGE/PPM             .1/ 3/   1.       1.3/ 3/  13.       1.8/ 3/  18.       1.5/ 3/  15.
  CO   SAMPLE METER/RANGE/PPM           99.3/ 3/2912.      73.1/11/ 315.      42.2/ 3/1012.      76.7/11/ 339.
  CO   BCKGRD METER/RANGE/PPM            1.1/ 3/  25.       2.2/11/   6.        .1/ 3/   2.       1.0/11/   3.
  CO2  SAMPLE METER/RANGE/PCT           62.7/ 3/ 1.12      44.3/ 3/  .76      58.5/ 3/ 1.03      42.9/ 3/  .73
  CO2  BCKGRD METER/RANGE/PCT            3.6/ 3/  .06       3.6/ 3/  .06       3.4/ 3/  .05       2.9/ 3/  .04
  NOX  SAMPLE METER/RANGE/PPM           70.4/ 2/  70.      42.3/ 2/  42.      92.1/ 2/  92.      41.9/ 2/  42.
  NOX  BCKGRD METER/RANGE/PPM             .6/ 2/   1.        .6/ 2/   1.        .8/ 2/   1.       1.6/ 2/   2.
  DILUTION FACTOR                            9.34              16.37              11.39              16.80
  HC   CONCENTRATION PPM                     368.               266.               436.               312.
  CO   CONCENTRATION PPM                    2784.               300.               975.               327.
  CO2  CONCENTRATION PCT                    1.07                .71                .99                .69
  NOX  CONCENTRATION PPM                    69.9               41.7               91.4               40.4
  HC   MASS GRAMS                          16.13              21.51              19.07              23.45
  CO   MASS GRAMS                         246.45              45.53              86.24              49.57
  CO2  MASS GRAMS                         1485.1             1688.4             1370.5             1647.4
  NOX  MASS GRAMS                           9.91              10.17              12.95               9.83

  HC   GRAMS/KM                             2.80               3.47               3.30               3.78
  CO   GRAMS/KM                            42.82               7.34              14.92               7.99
  CO2  GRAMS/KM                            258.0              272.2              237.1              265.4
  NOX  GRAMS/KM                             1.72               1.64               2.24               1.58
  FUEL CONSUMPTION BY CB L/100KM           14.27              12.50              11.57              12.38

  RUN TIME                SECONDS           505.               867.               505.               867.
  MEASURED DISTANCE       KM                5.76               6.20               5.78               6.21
       DFC, WET (DRY)                             .922 ( .909)                          .930 ( .917)
       SCF, WET (DRY)                            1.000 ( .977)                         1.000 ( .970)
       VOL (SCM)                                       206.5                                 206.3
       SAM BLR (SCM)                                    0.00                                  0.00
       KM  (MEASURED)                                  11.96                                 11.99
       FUEL CONSUMPTION L/100KM                        13.39                                 11.99

COMPOSITE RESULTS                                                                       3-BAG       (4-BAG)
   TEST NUMBER            723-31              CARBON DIOXIDE       G/KM              259.6       ( 257.6)
   BAROMETER     MM HG    739.4               FUEL CONSUMPTION     L/100KM            12.65       ( 12.59)
   HUMIDITY      G/KG      10.0               HYDROCARBONS (THC)   G/KM                3.28       (  3.38)
   TEMPERATURE   DEG C     26.7               CARBON MONOXIDE      G/KM               16.77       ( 16.96)
                                              OXIDES OF NITROGEN   G/KM                1.82       (  1.80)
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                                 VEHICLE EMISSIONS RESULTS - LEAN IDLE
                                  PROJECT 11-5830-004

TEST NO.   723-3    RUN   1              VEHICLE NO.72
VEHICLE MODEL   70 DODGE CHALLENG.       DATE   11/ 7/80             TEST WEIGHT  1588. KG( 3500. LBS)
ENGINE 3.7 L(225. CID) I-6               BAG CART NO.  1             ACTUAL ROAD LOAD   8.4 KW( 11.2 HP)
TRANSMISSION M3                          DYNO NO.      3             GASOLINE  EM-433-F
                                         CVS NO.   2                 ODOMETER 99831. KM(62032. MILES)

BAROMETER 738.38 MM HG(29.07 IN HG)      DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  44. PCT               ABS. HUMIDITY 10.0 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
   TEST CYCLE                               SET                  HFET

  BLOWER DIF P MM. H2O(IN. H2O)          759.5 (29.9)         756.9 (29.8)
  BLOWER INLET P MM. H2O(IN. H2O)        741.7 (29.2)         731.5 (28.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)         43.3 (110.0)
  BLOWER REVOLUTIONS                      112174.               61455.
  TOT FLOW STD. CU. METRES(SCF)          209.8 ( 7408.)       114.9 ( 4059.)
  HC   SAMPLE METER/RANGE/PPM           27.8/ 3/ 278.        25.1/ 3/ 251.
  HC   BCKGRD METER/RANGE/PPM            1.3/ 3/  13.         1.5/ 3/  15.
  CO   SAMPLE METER/RANGE/PPM           98.6/11/ 522.        25.4/ 3/ 589.
  CO   BCKGRD METER/RANGE/PPM             .6/11/   2.          .2/ 3/   5.
  CO2  SAMPLE METER/RANGE/PCT           47.6/ 3/ 1.22        82.3/ 3/ 1.52
  CO2  BCKGRD METER/RANGE/PCT            2.9/ 3/  .04         3.4/ 3/  .05
  NOX  SAMPLE METER/RANGE/PPM           48.3/ 3/ 145.        69.1/ 3/ 207.
  NOX  BCKGRD METER/RANGE/PPM             .3/ 3/   1.          .2/ 3/   1.
  DILUTION FACTOR                          10.36                 8.38
  HC   CONCENTRATION PPM                   266.                  238.
  CO   CONCENTRATION PPM                   500.                  559.
  CO2  CONCENTRATION PCT                   1.18                  1.47
  NOX  CONCENTRATION PPM                  144.1                 206.8
  HC   MASS GRAMS                         32.21                 15.76
  CO   MASS GRAMS                        122.21                 74.87
  CO2  MASS GRAMS                        4514.6                3096.8
  NOX  MASS GRAMS                         56.44                 43.73
  RUN TIME                SECONDS         1378.                  766.
       DFC, WET (DRY)                 .903 ( .891)          .881 ( .860)
       SCF, WET (DRY)                1.000 ( .974)         1.000 ( .772)
       VOL (SCM)                          209.8                 114.9
       SAM BLR (SCM)                       0.00                  0.00
       KM  (MEASURED)                     21.74                 16.24

  TEST NUMBER,                           723-32                723-33
  BAROMETER,              MM HG           738.4                 737.6
  HUMIDITY,               G/KG             10.0                   9.5
  TEMPERATURE,            DEG C            26.7                  26.1
   CARBON DIOXIDE,         G/KM           207.6                 190.7
  FUEL CONSUMPTION,       L/100KM          9.44                  8.58

  HYDROCARBONS,           G/KM             1.48                   .97
  CARBON MONOXIDE,        G/KM             5.62                  4.61
  OXIDES OF NITROGEN,     G/KM             2.60                  2.69
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TABLE D-17. TEST 731 EMISSIONS RESULTS

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                         FTP    VEHICLE EMISSIONS RESULTS  - UNMODIFIED
                                  PROJECT 11-5830-004

TEST NO.   731-1    RUN   1                     VEHICLE NO.73                             TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL    70 CHEV MONTECARLO             DATE   12/ 3/80                           ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                      BAG CART NO.  1                           GASOLINE  EM-433-F
TRANSMISSION A3                                 DYNO NO.      3                           ODOMETER ****** KM(86627. MILES)
                                                CVS NO.   2

BAROMETER 750.32 MM HG(29.54 IN HG)             DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  26. PCT                      ABS. HUMIDITY  4.9 GM/KG                  NOX HUMIDITY CORRECTION FACTOR   .84
BAG RESULTS
   BAG NUMBER                                         1                  2                   3                   4
   DESCRIPTION                                 COLD TRANSIENT       STABILIZED        HOT TRANSIENT         STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)               762.0 (30.0)        762.0 (30.0)        762.0 (30.0)        774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)             762.0 (30.0)        762.0 (30.0)        762.0 (30.0)        774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)            42.8 (109.0)        42.8 (109.0)        43.3 (110.0)        43.3 (110.0)
   BLOWER REVOLUTIONS                             40503.              69616.              40493.              69556.
   TOT FLOW STD. CU. METRES(SCF)                77.0 ( 2719.)      132.3 ( 4673.)       76.9 ( 2715.)      131.9 ( 4656.)
   HC  SAMPLE METER/RANGE/PPM                  42.1/ 3/ 421.       15.2/ 3/ 152.       23.5/ 3/ 235.       13.9/ 3/ 139.
   HC  BCKGRD METER/RANGE/PPM                   1.1/ 3/  11.        1.2/ 3/  12.        1.3/ 3/  13.        1.3/ 3/  13.
   CO  SAMPLE METER/RANGE/PPM                  72.9/ 2/4018.       66.2/11/ 272.       89.7/11/ 439.       87.8/12/ 214.
   CO  BCKGRD METER/RANGE/PPM                    .3/ 2/  11.        2.2/11/   6.        1.3/11/   4.        1.8/12/   3.
   CO2 SAMPLE METER/RANGE/PCT                  89.5/ 3/ 1.67       61.3/ 3/ 1.09       83.7/ 3/ 1.55       59.9/ 3/ 1.06
   CO2 BCKGRD METER/RANGE/PCT                   3.4/ 3/  .05        3.7/ 3/  .06        3.2/ 3/  .05        3.3/ 3/  .05
   NOX SAMPLE METER/RANGE/PPM                  53.3/ 3/ 160.       59.4/ 2/  59.       56.3/ 3/ 169.       59.2/ 2/  59.
   NOX BCKGRD METER/RANGE/PPM                    .1/ 3/   0.         .8/ 2/   1.         .3/ 3/   1.         .9/ 2/   1.
   DILUTION FACTOR                                 6.39               11.85                8.31               12.23
   HC  CONCENTRATION PPM                          412.                141.                224.                127.
   CO  CONCENTRATION PPM                         3846.                258.                419.                205.
   CO2 CONCENTRATION PCT                           1.62                1.04                1.50                1.01
   NOX CONCENTRATION PPM                         159.6                58.7               168.1                50.4
   HC  MASS GRAMS                                 18.20               10.76                9.91                9.66
   CO  MASS GRAMS                                344.76               39.72               37.51               31.44
   CO2 MASS GRAMS                               2209.2              2512.3              2116.8              2449.2
   NOX MASS GRAMS                                 19.75               12.47               20.77               12.36

   HC  GRAMS/KM                                    3.11                1.71                1.70                1.54
   CO  GRAMS/KM                                   58.70                6.32                6.43                5.00
   CO2 GRAMS/KM                                  389.8               399.8               362.6               389.2
   NOX GRAMS/KM                                    3.36                1.98                3.56                1.96
   FUEL CONSUMPTION BY CB L/100KM                 21.00               17.72               16.14               17.16

   RUN TIME                 SECONDS              504.                868.                505.                867.
   MEASURED DISTANCE        KM                     5.87                6.20                5.84                6.29
         DFC, WET (DRY)                                   .889 ( .882)                            .904 ( .897)
         SCF, WET (DRY)                                  1.000 ( .980)                           1.000 ( .980)
         VOL (SCM)                                               209.3                                   208.8
         SAM BLR (SCM)                                             0.00                                    0.00
         KM  (MEASURED)                                           12.16                                   12.13
         FUEL CONSUMPTION L/100KM                                 19.30                                   16.66

COMPOSITE RESULTS
   TEST NUMBER            731-11                                                                   3-BAG        (4-BAG)
   BAROMETER      MM HG   750.3                             CARBON DIOXIDE        G/KM             387.5       ( 384.4)
   HUMIDITY       G/KG      4.9                             FUEL CONSUMPTION      L/100KM           17.97       ( 17.80)
   TEMPERATURE    DEG C    24.4                             HYDROCARBONS (THC)    G/KM               2.00       (  1.95)
                                                            CARBON MONOXIDE       G/KM              17.23       ( 16.84)
                                                            OXIDES OF NITROGEN    G/KM               2.70       (  2.70)
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                                               VEHICLE EMISSIONS RESULTS  - UNMODIFIED
                                                 PROJECT 11-5830-004

TEST NO.   731-1    RUN   1                    VEHICLE NO.73                             TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL    70 CHEV MONTECARLO            DATE   12/ 3/80                           ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                     BAG CART NO.  1                           GASOLINE  EM-433-F
TRANSMISSION A3                                DYNO NO.      3                           ODOMETER ****** KM(86627. MILES)
                                               CVS NO.   2

BAROMETER 749.30 MM HG(29.50 IN HG)            DRY BULB TEMP. 28.9 DEG C(84.0 DEG F)
RELATIVE HUMIDITY  22. PCT                     ABS. HUMIDITY  5.5 GM/KG                  NOX HUMIDITY CORRECTION FACTOR   .85
BAG RESULTS
   TEST CYCLE                                       SET                          HFET

   BLOWER DIF P MM. H2O(IN. H2O)               774.7 (30.5)                  774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)             774.7 (30.5)                  774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)            42.8 (109.0)                  43.3 (110.0)
   BLOWER REVOLUTIONS                            111967.                        61341.
   TOT FLOW STD. CU. METRES(SCF)               212.1 ( 7491.)                116.0 ( 4095.)
   HC  SAMPLE METER/RANGE/PPM                   24.2/ 3/ 242.                 32.9/ 3/ 329.
   HC  BCKGRD METER/RANGE/PPM                    1.5/ 3/  15.                  1.6/ 3/  16.
   CO  SAMPLE METER/RANGE/PPM                   96.7/11/ 503.                 32.2/ 3/ 756.
   CO  BCKGRD METER/RANGE/PPM                    1.1/11/   3.                   .1/ 3/   2.
   CO2 SAMPLE METER/RANGE/PCT                   87.1/ 3/ 1.62                 45.1/ 2/ 1.98
   CO2 BCKGRD METER/RANGE/PCT                    3.6/ 3/  .06                  1.5/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM                   69.7/ 3/ 209.                 30.5/ 4/ 305.
   NOX BCKGRD METER/RANGE/PPM                     .4/ 3/   1.                   .1/ 4/   1.
   DILUTION FACTOR                                 7.93                          6.44
   HC  CONCENTRATION PPM                          229.                          315.
   CO  CONCENTRATION PPM                          481.                          719.
   CO2 CONCENTRATION PCT                           1.57                          1.93
   NOX CONCENTRATION PPM                          208.1                         304.2
   HC  MASS GRAMS                                  28.00                         21.10
   CO  MASS GRAMS                                 118.76                         97.13
   CO2 MASS GRAMS                                6094.9                        4102.3
   NOX MASS GRAMS                                  71.99                         58.91
   RUN TIME                 SECONDS              1397.                          765.
         DFC, WET (DRY)                         .874 ( .868)                  .845 ( .838)
         SCF, WET (DRY)                        1.000 ( .978)                 1.000 ( .974)
         VOL (SCM)                                212.1                         116.0
         SAM BLR (SCM)                              0.00                          0.00
         KM  (MEASURED)                            21.01                         16.59

   TEST NUMBER,                                 731-12                        731-13
   BAROMETER,               MM HG                749.3                         748.5
   HUMIDITY,                G/KG                   5.5                           6.3
   TEMPERATURE,             DEG C                 28.9                          30.0
    CARBON DIOXIDE,          G/KM                279.5                         247.2
   FUEL CONSUMPTION,        L/100KM               12.47                         11.12

   HYDROCARBONS,            G/KM                   1.28                          1.27
   CARBON MONOXIDE,         G/KM                   5.45                          5.85
   OXIDES OF NITROGEN,      G/KM                   3.30                          3.55
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TABLE D-18. TEST 731 EMISSIONS RESULTS

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                                  FTP   VEHICLE EMISSIONS RESULTS  - RICH BEST IDLE
                                          PROJECT 11-5830-004

TEST NO.   7313     RUN   1                 VEHICLE NO.73                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 CHEV MONTECARLO          DATE   12/ 9/80                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                  BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                             DYNO NO.      3                    ODOMETER ###### KM(###### MILES)
                                            CVS NO.   2

BAROMETER 744.73 MM HG(29.32 IN HG)         DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  34. PCT                  ABS. HUMIDITY  6.4 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .88
BAG RESULTS
  BAG NUMBER                                      1                 2                  3                 4
  DESCRIPTION                               COLD TRANSIENT      STABILIZED       HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             762.0 (30.0)      762.0 (30.0)      762.0 (30.0)      762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)           749.3 (29.5)      749.3 (29.5)      749.3 (29.5)      749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)      42.8 (109.0)      42.8 (109.0)      42.5 (108.5)
  BLOWER REVOLUTIONS                           40537.            69631.            40497.            69606.
  TOT FLOW STD. CU. METRES(SCF)              76.5 ( 2700.)    131.5 ( 4642.)     76.5 ( 2700.)    131.5 ( 4643.)
  HC  SAMPLE METER/RANGE/PPM                 48.5/ 3/ 485.     25.3/ 3/ 253.     31.0/ 3/ 310.     23.7/ 3/ 237.
  HC  BCKGRD METER/RANGE/PPM                  1.6/ 3/  16.      1.8/ 3/  18.      1.7/ 3/  17.      1.4/ 3/  14.
  CO  SAMPLE METER/RANGE/PPM                 83.6/ 2/4937.     81.1/ 3/2199.     72.9/ 3/1917.     75.7/ 3/2011.
  CO  BCKGRD METER/RANGE/PPM                   .1/ 2/   4.       .3/ 3/   7.       .1/ 3/   2.       .3/ 3/   7.
  CO2 SAMPLE METER/RANGE/PCT                 81.7/ 3/ 1.50     52.7/ 3/  .92     73.9/ 3/ 1.34     51.7/ 3/  .90
  CO2 BCKGRD METER/RANGE/PCT                  3.7/ 3/  .06      4.0/ 3/  .06      3.7/ 3/  .06      3.5/ 3/  .05
  NOX SAMPLE METER/RANGE/PPM                 43.5/ 3/ 131.     45.6/ 2/  46.     48.6/ 3/ 146.     45.2/ 2/  45.
  NOX BCKGRD METER/RANGE/PPM                   .5/ 3/   2.      2.0/ 2/   2.       .5/ 3/   2.      1.0/ 2/   1.
  DILUTION FACTOR                               6.61              11.57              8.59              11.97
  HC  CONCENTRATION PPM                        471.               237.               295.               224.
  CO  CONCENTRATION PPM                       4736.              2130.              1844.              1948.
  CO2 CONCENTRATION PCT                        1.46                .86               1.29                .85
  NOX CONCENTRATION PPM                       129.2               43.8              144.5               44.3
  HC  MASS GRAMS                              20.79              17.93              13.01              17.00
  CO  MASS GRAMS                             421.61             326.01             164.15             298.14
  CO2 MASS GRAMS                             2039.4             2078.0             1811.1             2048.2
  NOX MASS GRAMS                              16.56               9.64              18.51               9.76

  HC  GRAMS/KM                                 3.68               2.90               2.27               2.75
  CO  GRAMS/KM                                74.56              52.76              28.63              48.27
  CO2 GRAMS/KM                                360.7              336.3              315.9              331.6
  NOX GRAMS/KM                                 2.93               1.56               3.23               1.58
  FUEL CONSUMPTION BY CB L/100KM              20.89              18.29              15.71              17.76

  RUN TIME              SECONDS                505.               868.               504.               867.
  MEASURED DISTANCE     KM                     5.65               6.18               5.73               6.18
       DFC, WET (DRY)                                 .890 ( .880)                         .904 ( .894)
       SCF, WET (DRY)                                1.000 ( .978)                        1.000 ( .979)
       VOL (SCM)                                            207.9                                207.9
       SAM BLR (SCM)                                         0.00                                 0.00
       KM  (MEASURED)                                       11.83                                11.91
       FUEL CONSUMPTION L/100KM                             19.53                                16.78

COMPOSITE RESULTS                                                                               3-BAG      (4-BAG)
   TEST NUMBER              73131                          CARBON DIOXIDE      G/KM            335.7      ( 334.3)
   BAROMETER      MM HG   744.7                            FUEL CONSUMPTION    L/100KM         18.11      ( 17.96)
   HUMIDITY       G/KG      6.4                            HYDROCARBONS (THC)  G/KM             2.89      (  2.84)
   TEMPERATURE    DEG C    23.9                            CARBON MONOXIDE     G/KM            50.62      ( 49.29)
                                                           OXIDES OF NITROGEN  G/KM             2.30      (  2.31)
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                                        VEHICLE EMISSIONS RESULTS  - RICH BEST IDLE
                                         PROJECT 11-5830-004

TEST NO.   731-3    RUN   1                 VEHICLE NO.73                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 CHEV MONTECARLO          DATE   12/ 9/80                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                  BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                             DYNO NO.      3                    ODOMETER ###### KM(###### MILES)
                                            CVS NO.   2

BAROMETER 744.47 MM HG(29.31 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  30. PCT                  ABS. HUMIDITY  6.0 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .86
BAG RESULTS
  TEST CYCLE                                     SET                      HFET

  BLOWER DIF P MM. H2O(IN. H2O)             774.7 (30.5)             774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)           762.0 (30.0)             762.0 (30.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)          42.8 (109.0)             43.1 (109.5)
  BLOWER REVOLUTIONS                          112035.                   61414.
  TOT FLOW STD. CU. METRES(SCF)             211.1 ( 7453.)           115.6 ( 4080.)
  HC  SAMPLE METER/RANGE/PPM                 29.5/ 3/ 295.            36.1/ 3/ 361.
  HC  BCKGRD METER/RANGE/PPM                  1.2/ 3/  12.             1.4/ 3/  14.
  CO  SAMPLE METER/RANGE/PPM                 60.5/ 3/1526.            46.3/ 3/1122.
  CO  BCKGRD METER/RANGE/PPM                   .3/ 3/   7.              .2/ 3/   5.
  CO2 SAMPLE METER/RANGE/PCT                 81.7/ 3/ 1.50            43.8/ 2/ 1.91
  CO2 BCKGRD METER/RANGE/PCT                  3.0/ 3/  .05             1.3/ 2/  .05
  NOX SAMPLE METER/RANGE/PPM                 64.1/ 3/ 192.            30.0/ 4/ 300.
  NOX BCKGRD METER/RANGE/PPM                   .4/ 3/   1.              .2/ 4/   2.
  DILUTION FACTOR                               7.97                     6.53
  HC  CONCENTRATION PPM                        285.                     349.
  CO  CONCENTRATION PPM                       1461.                    1067.
  CO2 CONCENTRATION PCT                        1.46                     1.87
  NOX CONCENTRATION PPM                       191.3                    298.3
  HC  MASS GRAMS                              34.62                    23.26
  CO  MASS GRAMS                             358.98                   143.58
  CO2 MASS GRAMS                             5660.2                   3956.0
  NOX MASS GRAMS                              66.75                    57.11
  RUN TIME              SECONDS               1397.                     766.
       DFC, WET (DRY)                       .875 ( .866)             .847 ( .840)
       SCF, WET (DRY)                      1.000 ( .976)            1.000 ( .974)
       VOL (SCM)                              211.1                    115.6
       SAM BLR (SCM)                           0.00                     0.00
       KM  (MEASURED)                         21.67                    16.30

  TEST NUMBER,                                731-32                   731-33
  BAROMETER,            MM HG                 744.5                    744.0
  HUMIDITY,             G/KG                    6.0                      6.0
  TEMPERATURE,          DEG C                  25.0                     27.8
   CARBON DIOXIDE,       G/KM                 261.2                    242.6
  FUEL CONSUMPTION,     L/100KM               12.48                    11.14

  HYDROCARBONS,         G/KM                   1.60                     1.43
  CARBON MONOXIDE,      G/KM                  16.57                     8.81
  OXIDES OF NITROGEN,   G/KM                   3.08                     3.50
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TABLE D-19. TEST 731 EMISSIONS RESULTS

FTP

VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
PROJECT 11-5830-004

TEST NO. 731-4 RUN 1
VEHICLE MODEL 70 CHEV MONTECARLO
ENGINE 5.7 L(350. CID) V-8
TRANSMISSION A3

VEHICLE NO.73
DATE 12/18/80
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1814. KG(4000. LBS)
ACTUAL ROAD LOAD 8.9 KW(12.0 HP)
GASOLINE EM-433-F
ODOMETER ****** KM(86627. MILES)

BAROMETER 741.43 MM HG(29.19 IN HG)
RELATIVE HUMIDITY 43. PCT

DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
ABS. HUMIDITY 9.0 GM/KG

NOX HUMIDITY CORRECTION FACTOR .95

BAG RESULTS BAG NUMBER DESCRIPTION	1 COLD TRANSIENT	2 STABILIZED	3 HOT TRANSIENT	4 STABILIZED
BLOWER DIF P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET P MM. H2O(IN. H2O)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)	749.3 (29.5)
BLOWER INLET TEMP. DEG. C(DEG. F)	43.3 (110.0)	43.4 (110.5)	43.3 (110.0)	42.8 (109.0)
BLOWER REVOLUTIONS	40583.	69368.	40588.	69506.
TOT FLOW STD. CU. METRES(SCF)	76.2 (2690.)	130.5 (4609.)	76.2 (2690.)	130.6 (4611.)
HC SAMPLE METER/RANGE/PPM	52.0/ 3/ 520.	26.4/ 3/ 264.	29.6/ 3/ 296.	25.6/ 3/ 256.
HC BCKGRD METER/RANGE/PPM	1.4/ 3/ 14.	1.5/ 3/ 15.	1.5/ 3/ 15.	1.3/ 3/ 13.
CO SAMPLE METER/RANGE/PPM	85.8/ 2/3140.	89.5/ 3/2512.	69.6/ 3/1809.	81.0/ 3/2196.
CO BCKGRD METER/RANGE/PPM	.3/ 2/ 11.	.4/ 3/ 9.	.1/ 3/ 2.	.2/ 3/ 5.
CO2 SAMPLE METER/RANGE/PCT	83.3/ 3/ 1.54	54.5/ 3/ .95	73.7/ 3/ 1.34	53.0/ 3/ .93
CO2 BCKGRD METER/RANGE/PCT	4.0/ 3/ .06	4.5/ 3/ .07	4.4/ 3/ .07	4.0/ 3/ .06
NOX SAMPLE METER/RANGE/PPM	40.1/ 3/ 120.	42.0/ 2/ 42.	43.8/ 3/ 131.	43.3/ 2/ 43.
NOX BCKGRD METER/RANGE/PPM	.2/ 3/ 1.	.4/ 2/ 0.	.4/ 3/ 1.	.6/ 2/ 1.
DILUTION FACTOR	6.44	10.95	8.68	11.52
HC CONCENTRATION PPM	308.	250.	283.	244.
CO CONCENTRATION PPM	4907.	2423.	1735.	2122.
CO2 CONCENTRATION PCT	1.49	.89	1.28	.87
NOX CONCENTRATION PPM	119.8	41.6	130.3	42.8
HC MASS GRAMS	22.32	18.84	12.42	18.38
CO MASS GRAMS	435.15	348.20	153.87	322.63
CO2 MASS GRAMS	2073.0	2130.7	1785.3	2078.1
NOX MASS GRAMS	16.52	9.84	17.98	10.11
HC GRAMS/KM	3.83	3.01	2.14	2.95
CO GRAMS/KM	74.59	58.89	26.45	51.80
CO2 GRAMS/KM	355.4	340.8	306.9	333.6
NOX GRAMS/KM	2.83	1.57	3.09	1.62
FUEL CONSUMPTION BY CB L/100KM	20.69	18.90	15.16	18.11
RUN TIME SECONDS	505.	867.	506.	866.
MEASURED DISTANCE KM	5.83	6.25	5.82	6.23
DFC, WET (DRY)		.835 (.873)		.903 (.890)
SCF, WET (DRY)		1.000 (.975)		1.000 (.976)
VOL (SCM)		206.7		206.8
SAM BLR (SCM)		0.00		0.00
KM (MEASURED)		12.09		12.05
FUEL CONSUMPTION L/100KM		19.77		16.69

COMPOSITE RESULTS

TEST NUMBER		731-41
BAROMETER	MM HG	741.4
HUMIDITY	G/KG	9.0
TEMPERATURE	DEG C	25.6

		3-BAG	(4-BAG)
CARBON DIOXIDE	G/KM	334.5	(332.4)
FUEL CONSUMPTION	L/100KM	18.25	(18.01)
HYDROCARBONS (THC)	G/KM	2.94	(2.93)
CARBON MONOXIDE	G/KM	53.24	(51.13)
OXIDES OF NITROGEN	G/KM	2.25	(2.27)

VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
PROJECT 11-5830-004

TEST NO. 731-4 RUN 1
VEHICLE MODEL 70 CHEV MONTECARLO
ENGINE 5.7 L(350. CID) V-8
TRANSMISSION A3

VEHICLE NO.73
DATE 12/18/80
BAG CART NO. 1
DYNO NO. 3
CVS NO. 2

TEST WEIGHT 1814. KG(4000. LBS)
ACTUAL ROAD LOAD 8.9 KW(12.0 HP)
GASOLINE EM-433-F
ODOMETER ****** KM(86627. MILES)

BAROMETER 740.92 MM HG(29.17 IN HG)
RELATIVE HUMIDITY 40. PCT

DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
ABS. HUMIDITY 8.3 GM/KG

NOX HUMIDITY CORRECTION FACTOR .93

BAG RESULTS TEST CYCLE	SET	HFET
BLOWER DIF P MM. H2O(IN. H2O)	767.1 (30.2)	774.7 (30.5)
BLOWER INLET P MM. H2O(IN. H2O)	762.0 (30.0)	762.0 (30.0)
BLOWER INLET TEMP. DEG. C(DEG. F)	42.8 (109.0)	43.3 (110.0)
BLOWER REVOLUTIONS	111950.	61412.
TOT FLOW STD. CU. METRES(SCF)	209.8 (7409.)	114.9 (4056.)
HC SAMPLE METER/RANGE/PPM	31.5/ 3/ 315.	39.7/ 3/ 397.
HC BCKGRD METER/RANGE/PPM	1.5/ 3/ 15.	1.7/ 3/ 17.
CO SAMPLE METER/RANGE/PPM	62.6/ 3/1589.	46.4/ 3/1124.
CO BCKGRD METER/RANGE/PPM	.6/ 3/ 14.	.3/ 3/ 7.
CO2 SAMPLE METER/RANGE/PCT	83.9/ 3/ 1.55	44.1/ 2/ 1.92
CO2 BCKGRD METER/RANGE/PCT	4.4/ 3/ .07	1.6/ 2/ .06
NOX SAMPLE METER/RANGE/PPM	67.3/ 3/ 202.	29.7/ 4/ 297.
NOX BCKGRD METER/RANGE/PPM	.4/ 3/ 1.	.1/ 4/ 1.
DILUTION FACTOR	7.73	6.47
HC CONCENTRATION PPM	302.	383.
CO CONCENTRATION PPM	1510.	1062.
CO2 CONCENTRATION PCT	1.49	1.88
NOX CONCENTRATION PPM	200.9	296.2
HC MASS GRAMS	36.53	25.35
CO MASS GRAMS	368.78	142.07
CO2 MASS GRAMS	5731.4	3947.0
NOX MASS GRAMS	74.74	61.17
RUN TIME SECONDS	1397.	766.
DFC, WET (DRY)	.871 (.859)	.845 (.834)
SCF, WET (DRY)	1.000 (.973)	1.000 (.969)
VOL (SCM)	209.8	114.9
SAM BLR (SCM)	0.00	0.00
KM (MEASURED)	21.81	16.51

TEST NUMBER,		731-42	731-43
BAROMETER,	MM HG	740.9	740.4
HUMIDITY,	G/KG	8.3	8.8
TEMPERATURE,	DEG C	25.6	26.1
CARBON DIOXIDE,	G/KM	262.7	239.1
FUEL CONSUMPTION,	L/100KM	12.58	10.99
HYDROCARBONS,	G/KM	1.67	1.54
CARBON MONOXIDE,	G/KM	16.91	8.61
OXIDES OF NITROGEN,	G/KM	3.43	3.71

TABLE D-20. TEST 732 EMISSIONS RESULTS

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                          FTP    VEHICLE EMISSIONS RESULTS  -  W/O VAC. ADVANCE
                                  PROJECT 11-5830-004

TEST NO.   732-1     RUN   1                 VEHICLE NO.73                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 CHEV MONTECARLO           DATE    11/12/80                   ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                   BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                              DYNO NO.      3                    ODOMETER ****** KM(86627. MILES)
                                             CVS NO.   2

BAROMETER 744.47 MM HG(29.31 IN HG)          DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  44. PCT                   ABS. HUMIDITY  9.4 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .96
BAG RESULTS
   BAG NUMBER                                      1                 2                 3                  4
   DESCRIPTION                               COLD TRANSIENT     STABILIZED       HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)              749.3 (29.5)     749.3 (29.5)     749.3 (29.5)      749.3 (29.5)
   BLOWER INLET P MM. H2O(IN. H2O)            749.3 (29.5)     749.3 (29.5)     749.3 (29.5)      749.3 (29.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)           43.9 (111.0)     43.3 (110.0)     43.3 (110.0)      43.3 (110.0)
   BLOWER REVOLUTIONS                            40544.           69696.           40463.            69649.
   TOT FLOW STD. CU. METRES(SCF)               76.4 ( 2698.)   131.5 ( 4642.)    76.3 ( 2695.)    131.4 ( 4639.)
   HC   SAMPLE METER/RANGE/PPM                31.3/ 3/ 313.    14.0/ 3/ 140.    22.8/ 3/ 228.     16.2/ 3/ 162.
   HC   BCKGRD METER/RANGE/PPM                 1.3/ 3/  13.     1.3/ 3/  13.     1.4/ 3/  14.      1.5/ 3/  15.
   CO   SAMPLE METER/RANGE/PPM                58.3/ 2/2933.    77.4/11/ 344.    95.4/11/ 490.     24.7/ 3/ 572.
   CO   BCKGRD METER/RANGE/PPM                  .1/ 2/   4.     1.8/11/   5.     1.3/11/   4.       .1/ 3/   2.
   CO2  SAMPLE METER/RANGE/PCT                92.7/ 3/ 1.73    45.9/ 3/ 1.18    85.2/ 3/ 1.58     63.7/ 3/ 1.14
   CO2  BCKGRD METER/RANGE/PCT                 3.8/ 3/  .06     3.8/ 3/  .06     3.5/ 3/  .05      3.8/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM                74.4/ 2/  74.    31.4/ 2/  31.    73.6/ 2/  74.     30.0/ 2/  30.
   NOX  BCKGRD METER/RANGE/PPM                  .8/ 2/   1.     1.1/ 2/   1.      .9/ 2/   1.      1.1/ 2/   1.
   DILUTION FACTOR                               6.55             10.91             8.13             11.09
   HC   CONCENTRATION PPM                       302.              128.             216.              148.
   CO   CONCENTRATION PPM                      2790.              326.             465.              549.
   CO2  CONCENTRATION PCT                        1.69              1.13             1.53              1.08
   NOX  CONCENTRATION PPM                       73.7              30.4             72.8              29.0
   HC   MASS GRAMS                              13.31              9.72             9.49             11.24
   CO   MASS GRAMS                             248.20             49.96            41.35             84.04
   CO2  MASS GRAMS                            2358.0            2715.6           2139.3            2607.0
   NOX  MASS GRAMS                              10.33              7.33            10.19              6.98

   HC   GRAMS/KM                                 2.29              1.55             1.64              1.81
   CO   GRAMS/KM                                42.71              7.96             7.16             13.53
   CO2  GRAMS/KM                               405.8             432.7            370.3             419.6
   NOX  GRAMS/KM                                 1.78              1.17             1.76              1.12
   FUEL CONSUMPTION BY CB L/100KM               20.49             19.21            16.51             19.06

   RUN TIME              SECONDS                504.              868.             504.              868.
   MEASURED DISTANCE     KM                     5.81              6.28             5.70              6.21
        DFC, WET (DRY)                              .886 ( .873)                        .898 ( .885)
        SCF, WET (DRY)                             1.000 ( .973)                       1.000 ( .974)
        VOL (SCM)                                         207.9                               207.7
        SAM BLR (SCM)                                      0.00                                0.00
        KM  (MEASURED)                                    12.09                               11.99
        FUEL CONSUMPTION L/100KM                          19.83                               17.83

                                                                                              3-BAG      (4-BAG)
COMPOSITE RESULTS                                         CARBON DIOXIDE       G/KM          410.1      ( 406.1)
   TEST NUMBER            732-11                          FUEL CONSUMPTION     L/100KM        18.74      ( 18.69)
   BAROMETER      MM HG   744.5                           HYDROCARBONS (THC)   G/KM            1.73      (  1.80)
   HUMIDITY       G/KG      9.4                           CARBON MONOXIDE      G/KM           14.93      ( 16.57)
   TEMPERATURE    DEG C    26.1                           OXIDES OF NITROGEN   G/KM            1.46      (  1.44)
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                                 VEHICLE EMISSIONS RESULTS  -  W/O VAC. ADVANCE
                                  PROJECT 11-5830-004

TEST NO.   732-1     RUN   1                 VEHICLE NO.73                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 CHEV MONTECARLO           DATE    11/12/80                   ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                   BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                              DYNO NO.      3                    ODOMETER ****** KM(86627. MILES)
                                             CVS NO.   2

BAROMETER 743.97 MM HG(29.29 IN HG)          DRY BULB TEMP. 26.7 DEG C(80.0 DEG F)
RELATIVE HUMIDITY  44. PCT                   ABS. HUMIDITY  9.9 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .97
BAG RESULTS
   TEST CYCLE                                     SET                    HFET

   BLOWER DIF P MM. H2O(IN. H2O)              762.0 (30.0)           762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)            762.0 (30.0)           762.0 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)           43.3 (110.0)           43.3 (110.0)
   BLOWER REVOLUTIONS                           112056.                 61411.
   TOT FLOW STD. CU. METRES(SCF)              210.8 ( 7444.)         115.5 ( 4078.)
   HC   SAMPLE METER/RANGE/PPM                20.2/ 3/ 202.          18.2/ 3/ 182.
   HC   BCKGRD METER/RANGE/PPM                 1.6/ 3/  16.           1.4/ 3/  14.
   CO   SAMPLE METER/RANGE/PPM                94.1/11/ 478.          24.9/ 3/ 577.
   CO   BCKGRD METER/RANGE/PPM                 1.1/11/   3.            .1/ 3/   2.
   CO2  SAMPLE METER/RANGE/PCT                95.0/ 3/ 1.78          50.7/ 2/ 2.28
   CO2  BCKGRD METER/RANGE/PCT                 3.9/ 3/  .06           1.8/ 2/  .06
   NOX  SAMPLE METER/RANGE/PPM                87.9/ 2/  88.          42.6/ 3/ 128.
   NOX  BCKGRD METER/RANGE/PPM                 1.1/ 2/   1.            .2/ 3/   1.
   DILUTION FACTOR                               7.25                   5.70
   HC   CONCENTRATION PPM                       188.                   170.
   CO   CONCENTRATION PPM                       452.                   541.
   CO2  CONCENTRATION PCT                        1.73                   2.22
   NOX  CONCENTRATION PPM                       87.0                   127.3
   HC   MASS GRAMS                              22.88                  11.35
   CO   MASS GRAMS                             110.99                  72.81
   CO2  MASS GRAMS                            6683.9                 4704.5
   NOX  MASS GRAMS                              34.11                  27.36
   RUN TIME              SECONDS               1398.                   766.
        DFC, WET (DRY)                       .862 ( .850)           .825 ( .813)
        SCF, WET (DRY)                      1.000 ( .969)          1.000 ( .965)
        VOL (SCM)                              210.8                  115.5
        SAM BLR (SCM)                           0.00                   0.00
        KM  (MEASURED)                         21.83                  16.41

   TEST NUMBER,                                732-12                 732-13
   BAROMETER,            MM HG                 744.0                  743.7
   HUMIDITY,             G/KG                    9.9                    9.9
   TEMPERATURE,          DEG C                  26.7                   26.7
    CARBON DIOXIDE,       G/KM                 306.2                  286.7
   FUEL CONSUMPTION,     L/100KM               13.55                  12.63

   HYDROCARBONS,         G/KM                   1.05                    .69
   CARBON MONOXIDE,      G/KM                   5.08                   4.44
   OXIDES OF NITROGEN,   G/KM                   1.56                   1.67
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TABLE D-21. TEST 732 EMISSIONS RESULTS

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                                        FTP   VEHICLE EMISSIONS RESULTS  - 12% IGN. MISFIRE W/O VAC. ADV.
                                               PROJECT 11-5830-004

TEST NO.   732-2   RUN  1                    VEHICLE NO.73                          TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 CHEV MONTECARLO           DATE   11/13/80                        ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                   BAG CART NO.  1                        GASOLINE  EM-433-F
TRANSMISSION A3                              DYNO NO.      3                        ODOMETER     0. KM(    0. MILES)
                                             CVS NO.   2

BAROMETER 741.48 MM HG(29.20 IN HG)          DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  34. PCT                   ABS. HUMIDITY  7.4 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .90
BAG RESULTS
  BAG NUMBER                                       1                   2                   3                   4
  DESCRIPTION                               COLD TRANSIENT        STABILIZED         HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)             749.3 (29.5)        749.3 (29.5)        749.3 (29.5)        749.3 (29.5)
  BLOWER INLET P MM. H2O(IN. H2O)           749.3 (29.5)        749.3 (29.5)        749.3 (29.5)        749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)        42.8 (109.0)        42.8 (109.0)        43.3 (110.0)
  BLOWER REVOLUTIONS                           40641.              69702.              40527.              69660.
  TOT FLOW STD. CU. METRES(SCF)              76.4 ( 2696.)      131.1 ( 4628.)       76.2 ( 2691.)      130.9 ( 4621.)
  HC   SAMPLE METER/RANGE/PPM               21.5/ 4/2150.       11.8/ 4/1180.       16.2/ 4/1620.       11.8/ 4/1180.
  HC   BCKGRD METER/RANGE/PPM                 .2/ 4/  20.         .3/ 4/  30.         .3/ 4/  30.         .3/ 4/  30.
  CO   SAMPLE METER/RANGE/PPM               93.9/ 3/2687.       74.4/11/ 323.       93.8/11/ 475.       73.2/11/ 315.
  CO   BCKGRD METER/RANGE/PPM                 .1/ 3/   2.        1.4/11/   4.        1.3/11/   4.        1.3/11/   4.
  CO2  SAMPLE METER/RANGE/PCT               87.9/ 3/ 1.63       60.8/ 3/ 1.08       81.8/ 3/ 1.51       62.5/ 3/ 1.11
  CO2  BCKGRD METER/RANGE/PCT                3.3/ 3/  .05        3.5/ 3/  .05        4.7/ 3/  .07        6.0/ 3/  .09
  NOX  SAMPLE METER/RANGE/PPM               95.1/ 2/  95.       45.1/ 2/  45.       97.9/ 2/  98.       45.8/ 2/  46.
  NOX  BCKGRD METER/RANGE/PPM                1.6/ 2/   2.        1.5/ 2/   2.        1.3/ 2/   1.        1.3/ 2/   1.
  DILUTION FACTOR                                6.36               10.91                7.81               10.62
  HC   CONCENTRATION PPM                     2133.               1153.               1594.               1153.
  CO   CONCENTRATION PPM                     2371.                309.                453.                302.
  CO2  CONCENTRATION PCT                        1.59                1.03                1.44                1.03
  NOX  CONCENTRATION PPM                       93.8                43.7                96.8                44.6
  HC   MASS GRAMS                              93.92               87.12               70.04               86.99
  CO   MASS GRAMS                             228.51               47.20               40.20               45.96
  CO2  MASS GRAMS                            2225.0              2472.1              2014.8              2465.0
  NOX  MASS GRAMS                              12.35                9.89               12.72               10.08

  HC   GRAMS/KM                                16.11               13.83               11.98               13.81
  CO   GRAMS/KM                                39.19                7.49                6.88                7.30
  CO2  GRAMS/KM                               381.6               392.3               344.8               391.3
  NOX  GRAMS/KM                                 2.12                1.57                2.18                1.60
  FUEL CONSUMPTION BY CB L/100KM               21.10               19.12               16.80               19.06

  RUN TIME              SECONDS               505.                867.                505.                868.
  MEASURED DISTANCE     KM                      5.83                6.30                5.84                6.30
       DFC, WET (DRY)                                    .884 ( .874)                       .893 ( .883)
       SCF, WET (DRY)                                   1.000 ( .977)                      1.000 ( .977)
       VOL (SCM)                                               207.4                              207.1
       SAM BLR (SCM)                                             0.00                               0.00
       KM  (MEASURED)                                           12.13                              12.14
       FUEL CONSUMPTION L/100KM                                 20.07                              17.97

COMPOSITE RESULTS                                                                                3-BAG       (4-BAG)
  TEST NUMBER            732-21                             CARBON DIOXIDE        G/KM          377.0       ( 376.8)
  BAROMETER     MM HG    741.7                              FUEL CONSUMPTION      L/100KM        18.89      ( 18.87)
  HUMIDITY      G/KG       7.4                              HYDROCARBONS (THC)    G/KM           13.79      ( 13.79)
  TEMPERATURE   DEG C     26.1                              CARBON MONOXIDE       G/KM           13.87      ( 13.82)
                                                            OXIDES OF NITROGEN    G/KM            1.85      (  1.86)
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                                              VEHICLE EMISSIONS RESULTS  - 12% IGN. MISFIRE W/O VAC. ADV.
                                               PROJECT 11-5830-004

TEST NO.   732-2   RUN  1                    VEHICLE NO.73                          TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 CHEV MONTECARLO           DATE   11/13/80                        ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                   BAG CART NO.  1                        GASOLINE  EM-433-F
TRANSMISSION A3                              DYNO NO.      3                        ODOMETER     0. KM(    0. MILES)
                                             CVS NO.   2

BAROMETER 740.92 MM HG(29.17 IN HG)          DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  38. PCT                   ABS. HUMIDITY  7.1 GM/KG               NOX HUMIDITY CORRECTION FACTOR   .89
BAG RESULTS
  TEST CYCLE                                       SET                      HFET

  BLOWER DIF P MM. H2O(IN. H2O)             762.0 (30.0)             749.3 (29.5)
  BLOWER INLET P MM. H2O(IN. H2O)           762.0 (30.0)             749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)          43.3 (110.0)             43.3 (110.0)
  BLOWER REVOLUTIONS                          112130.                   61425.
  TOT FLOW STD. CU. METRES(SCF)             210.0 ( 7416.)           115.2 ( 4068.)
  HC   SAMPLE METER/RANGE/PPM               17.5/ 4/1750.            21.8/ 4/2180.
  HC   BCKGRD METER/RANGE/PPM                 .2/ 4/  20.              .2/ 4/  20.
  CO   SAMPLE METER/RANGE/PPM               96.3/11/ 499.            25.7/ 3/ 596.
  CO   BCKGRD METER/RANGE/PPM                 .7/11/   2.              .1/ 3/   2.
  CO2  SAMPLE METER/RANGE/PCT               89.1/ 3/ 1.66            47.7/ 2/ 2.11
  CO2  BCKGRD METER/RANGE/PCT                3.6/ 3/  .06             1.2/ 2/  .04
  NOX  SAMPLE METER/RANGE/PPM               37.6/ 3/ 113.            55.7/ 3/ 167.
  NOX  BCKGRD METER/RANGE/PPM                 .2/ 3/   1.              .3/ 3/   1.
  DILUTION FACTOR                                7.12                     5.61
  HC   CONCENTRATION PPM                     1733.                    2164.
  CO   CONCENTRATION PPM                      475.                     564.
  CO2  CONCENTRATION PCT                        1.61                     2.08
  NOX  CONCENTRATION PPM                      112.3                    166.4
  HC   MASS GRAMS                             209.84                   143.74
  CO   MASS GRAMS                             116.20                    75.63
  CO2  MASS GRAMS                            6198.0                   4387.4
  NOX  MASS GRAMS                              40.31                    32.85
  RUN TIME              SECONDS              1397.                     766.
       DFC, WET (DRY)                        .860 ( .849)             .822 ( .813)
       SCF, WET (DRY)                       1.000 ( .972)            1.000 ( .970)
       VOL (SCM)                              210.0                    115.2
       SAM BLR (SCM)                            0.00                     0.00
       KM  (MEASURED)                          21.74                    16.54

  TEST NUMBER,                               732-22                   732-23
  BARONETER,            MM HG                740.9                    740.7
  HUMIDITY,             G/KG                   7.1                      7.2
  TEMPERATURE,          DEG C                 23.9                     26.7
   CARBON DIOXIDE,       G/KM                285.1                    265.3
  FUEL CONSUMPTION,     L/100KM               13.84                    12.81

  HYDROCARBONS,         G/KM                   9.65                     8.69
  CARBON MONOXIDE,      G/KM                   5.35                     4.57
  OXIDES OF NITROGEN,   G/KM                   1.85                     1.99
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TABLE D-22. TEST 732 EMISSIONS RESULTS

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                                  FTP    VEHICLE EMISSIONS RESULTS  - 12% IGN. MISFIRE W/O VAC. ADV.
                                          PROJECT 11-5830-004

TEST NO.   732-3    RUN   1                VEHICLE NO.73                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL    70 CHEV MONTECARLO        DATE    11/14/80                   ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                 BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                            DYNO NO.      3                    ODOMETER      0. KM(     0. MILES)
                                           CVS NO.   2

BAROMETER 740.16 MM HG(29.14 IN HG)        DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  57. PCT                 ABS. HUMIDITY 11.9 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.04
BAG RESULTS
  BAG NUMBER                                     1                 2                  3                 4
  DESCRIPTION                              COLD TRANSIENT      STABILIZED       HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)            736.6 (29.0)       762.0 (30.0)       736.6 (29.0)       762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)          736.6 (29.0)       762.0 (30.0)       736.6 (29.0)       762.0 (30.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)       43.3 (110.0)       42.8 (109.0)       42.8 (109.0)
  BLOWER REVOLUTIONS                          40424.             69592.             40454.             69513.
  TOT FLOW STD. CU. METRES(SCF)             75.9 ( 2680.)     130.2 ( 4597.)      76.0 ( 2685.)     130.2 ( 4596.)
  HC   SAMPLE METER/RANGE/PPM              23.4/ 4/2340.      12.1/ 4/1210.      16.5/ 4/1650.      11.7/ 4/1170.
  HC   BCKGRD METER/RANGE/PPM                .1/ 4/  10.        .2/ 4/  20.        .1/ 4/  10.        .3/ 4/  30.
  CO   SAMPLE METER/RANGE/PPM              97.3/ 3/2827.      72.4/11/ 310.      90.4/11/ 445.      45.0/11/ 265.
  CO   BCKGRD METER/RANGE/PPM                .3/ 3/   7.       1.5/11/   4.       1.2/11/   3.       1.2/11/   3.
  CO2  SAMPLE METER/RANGE/PCT              91.4/ 3/ 1.71      63.0/ 3/ 1.12      82.7/ 3/ 1.53      61.9/ 3/ 1.10
  CO2  BCKGRD METER/RANGE/PCT               3.5/ 3/  .05       3.7/ 3/  .06       3.6/ 3/  .06       3.9/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM              85.6/ 2/  86.      40.9/ 2/  41.      91.2/ 2/  91.      42.5/ 2/  43.
  NOX  BCKGRD METER/RANGE/PPM                .5/ 2/   1.        .5/ 2/   1.        .6/ 2/   1.        .9/ 2/   1.
  DILUTION FACTOR                              6.06              10.52               7.73              10.78
  HC   CONCENTRATION PPM                      2352.              1192.              1641.              1143.
  CO   CONCENTRATION PPM                      2677.               294.               421.               251.
  CO2  CONCENTRATION PCT                      1.66               1.07               1.48               1.05
  NOX  CONCENTRATION PPM                      85.2               40.4               90.7               41.7
  HC   MASS GRAMS                            102.93              89.48              71.96              85.77
  CO   MASS GRAMS                            236.58              44.54              37.23              38.03
  CO2  MASS GRAMS                            2310.9             2553.9             2057.1             2494.0
  NOX  MASS GRAMS                             12.86              10.48              13.72              10.79

  HC   GRAMS/KM                               17.37              14.14              12.26              13.55
  CO   GRAMS/KM                               39.92               7.04               6.34               6.01
  CO2  GRAMS/KM                               389.9              403.5              350.3              394.0
  NOX  GRAMS/KM                                2.17               1.66               2.34               1.71
  FUEL CONSUMPTION BY CB L/100KM              21.67              19.61              17.04              19.05

  RUN TIME               SECONDS               504.               868.               504.               867.
  MEASURED DISTANCE      KM                    5.93               6.33               5.87               6.33
       DFC, WET (DRY)                                   .879 ( .863)                          .894 ( .877)
       SCF, WET (DRY)                                  1.000 ( .969)                         1.000 ( .970)
       VOL (SCM)                                             206.1                                 206.2
       SAM BLR (SCM)                                          0.00                                  0.00
       KM  (MEASURED)                                        12.26                                 12.20
       FUEL CONSUMPTION L/100KM                              20.61                                 18.08

                                                                                               3-BAG      (4-BAG)
COMPOSITE RESULTS                                               CARBON DIOXIDE       G/KM      386.1     ( 383.3)
   TEST NUMBER           732-31                                 FUEL CONSUMPTION     L/100KM   19.33     ( 19.17)
   BAROMETER     MM HG   740.2                                  HYDROCARBONS (THC)   G/KM      14.29     ( 14.12)
   HUMIDITY      G/KG     11.9                                  CARBON MONOXIDE      G/KM      13.68     ( 13.38)
   TEMPERATURE   DEG C    25.6                                  OXIDES OF NITROGEN   G/KM       1.95     (  1.96)
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                                           VEHICLE EMISSIONS RESULTS  - 12% IGN. MISFIRE W/O VAC. ADV.
                                            PROJECT 11-5830-004

TEST NO.   732-3    RUN   1                VEHICLE NO.73                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL    70 CHEV MONTECARLO        DATE    11/14/80                   ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8                 BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                            DYNO NO.      3                    ODOMETER ****** KM(86627. MILES)
                                           CVS NO.   2

BAROMETER 739.90 MM HG(29.13 IN HG)        DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  47. PCT                 ABS. HUMIDITY 10.2 GM/KG           NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
  TEST CYCLE                                  SET                         HFET

  BLOWER DIF P MM. H2O(IN. H2O)            762.0 (30.0)                774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)          762.0 (30.0)                774.7 (30.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)         42.8 (109.0)                43.3 (110.0)
  BLOWER REVOLUTIONS                         112013.                      61335.
  TOT FLOW STD. CU. METRES(SCF)            209.7 ( 7404.)              114.4 ( 4041.)
  HC   SAMPLE METER/RANGE/PPM              18.4/ 4/1840.               21.7/ 4/2170.
  HC   BCKGRD METER/RANGE/PPM                .2/ 4/  20.                 .4/ 4/  40.
  CO   SAMPLE METER/RANGE/PPM              94.9/11/ 486.               26.0/ 3/ 603.
  CO   BCKGRD METER/RANGE/PPM                .8/11/   2.                 .2/ 3/   5.
  CO2  SAMPLE METER/RANGE/PCT              93.1/ 3/ 1.74               48.4/ 2/ 2.15
  CO2  BCKGRD METER/RANGE/PCT               3.1/ 3/  .05                1.5/ 2/  .05
  NOX  SAMPLE METER/RANGE/PPM              37.0/ 3/ 111.               46.0/ 3/ 138.
  NOX  BCKGRD METER/RANGE/PPM                .4/ 3/   1.                 .5/ 3/   2.
  DILUTION FACTOR                              6.79                        5.52
  HC   CONCENTRATION PPM                      1823.                       2137.
  CO   CONCENTRATION PPM                       460.                        566.
  CO2  CONCENTRATION PCT                      1.70                        2.11
  NOX  CONCENTRATION PPM                      110.0                       136.8
  HC   MASS GRAMS                            220.40                      141.04
  CO   MASS GRAMS                            112.29                       75.41
  CO2  MASS GRAMS                            4536.8                      4418.7
  NOX  MASS GRAMS                             43.35                       29.66
  RUN TIME              SECONDS               1398.                        766.
       DFC, WET (DRY)                      .853 ( .840)                .819 ( .807)
       SCF, WET (DRY)                     1.000 ( .969)               1.000 ( .966)
       VOL (SCM)                              209.7                       114.4
       SAM BLR (SCM)                           0.00                        0.00
       KM  (MEASURED)                         21.90                       16.57

  TEST NUMBER,                               732-32                      732-33
  BAROMETER,            MM HG                 739.9                       739.6
  HUMIDITY,             G/KG                   10.2                        10.4
  TEMPERATURE,          DEG C                  26.1                        27.2
   CARBON DIOXIDE,       G/KM                 298.4                       266.7
  FUEL CONSUMPTION,     L/100KM               14.44                       12.84

  HYDROCARBONS,         G/KM                  10.06                        8.51
  CARBON MONOXIDE,      G/KM                   5.13                        4.55
  OXIDES OF NITROGEN,   G/KM                   1.98                        1.79
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TABLE D-23. TEST 7 EMISSIONS RESULTS

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                          FTP    VEHICLE EMISSIONS RESULTS  - UNMODIFIED
                                  PROJECT 11-5830-004

TEST NO.   733-1    RUN   1                 VEHICLE NO.73
VEHICLE MODEL   70 CHEV MONTECARLO          DATE   12/19/80                 TEST WEIGHT  1814. KG( 4000. LBS)
ENGINE 5.7 L(350. CID) V-8                  BAG CART NO.  1                 ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
TRANSMISSION A3                             DYNO NO.      3                 GASOLINE  EM-433-F
                                            CVS NO.   2                     ODOMETER ****** KM(86627. MILES)

BAROMETER 748.03 MM HG(29.45 IN HG)         DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  29. PCT                  ABS. HUMIDITY  5.5 GM/KG        NOX HUMIDITY CORRECTION FACTOR   .85
BAG RESULTS
  BAG NUMBER                                     1                 2                  3                 4
  DESCRIPTION                              COLD TRANSIENT      STABILIZED       HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)            762.0 (30.0)      762.0 (30.0)      762.0 (30.0)      767.1 (30.2)
  BLOWER INLET P MM. H2O(IN. H2O)          749.3 (29.5)      749.3 (29.5)      749.3 (29.5)      756.9 (29.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)         42.8 (109.0)      43.1 (109.5)      43.3 (110.0)      43.3 (110.0)
  BLOWER REVOLUTIONS                          40582.            69587.            40458.            69468.
  TOT FLOW STD. CU. METRES(SCF)             77.0 ( 2719.)    132.0 ( 4660.)     76.7 ( 2708.)    131.5 ( 4645.)
  HC   SAMPLE METER/RANGE/PPM              50.5/ 3/ 505.     14.8/ 3/ 148.     21.1/ 3/ 211.     13.8/ 3/ 138.
  HC   BCKGRD METER/RANGE/PPM                .9/ 3/   9.       .9/ 3/   9.       .8/ 3/   8.       .8/ 3/   8.
  CO   SAMPLE METER/RANGE/PPM              81.1/ 2/4712.     63.4/11/ 255.     77.9/11/ 347.     78.3/12/ 184.
  CO   BCKGRD METER/RANGE/PPM                .1/ 2/   4.       .8/11/   2.       .1/11/   0.       .2/12/   0.
  CO2  SAMPLE METER/RANGE/PCT              85.5/ 3/ 1.58     60.7/ 3/ 1.08     76.4/ 3/ 1.40     58.6/ 3/ 1.04
  CO2  BCKGRD METER/RANGE/PCT               2.9/ 3/  .04      3.0/ 3/  .05      2.5/ 3/  .04      2.2/ 3/  .03
  NOX  SAMPLE METER/RANGE/PPM              50.5/ 3/ 152.     58.8/ 2/  59.     49.3/ 3/ 148.     55.6/ 2/  56.
  NOX  BCKGRD METER/RANGE/PPM                .2/ 3/   1.       .8/ 2/   1.       .2/ 3/   1.       .6/ 2/   1.
  DILUTION FACTOR                             6.42             12.00              9.24             12.36
  HC   CONCENTRATION PPM                     497.              140.              204.              131.
  CO   CONCENTRATION PPM                    4522.              246.              334.              178.
  CO2  CONCENTRATION PCT                    1.55              1.03              1.36              1.00
  NOX  CONCENTRATION PPM                   151.0              58.1             147.4              55.0
  HC   MASS GRAMS                          22.08             10.63              9.01              9.91
  CO   MASS GRAMS                         405.33             37.72             29.86             27.28
  CO2  MASS GRAMS                         2180.3            2500.0            1911.1            2418.5
  NOX  MASS GRAMS                          19.00             12.52             18.47             11.83

  HC   GRAMS/KM                             3.78              1.69              1.55              1.39
  CO   GRAMS/KM                            69.38              6.00              5.15              4.37
  CO2  GRAMS/KM                            373.2             398.0             329.4             387.8
  NOX  GRAMS/KM                             3.25              1.99              3.18              1.90
  FUEL CONSUMPTION BY CB L/100KM           21.10             17.62             14.62             17.06

  RUN TIME               SECONDS            505.              867.              504.              866.
  MEASURED DISTANCE      KM                 5.84              6.28              5.80              6.24
       DFC, WET (DRY)                             .890 ( .882)                        .910 ( .901)
       SCF, WET (DRY)                            1.000 ( .979)                       1.000 ( .980)
       VOL (SCM)                                       209.0                               208.2
       SAM BLR (SCM)                                    0.00                                0.00
       KM  (MEASURED)                                  12.12                               12.04
       FUEL CONSUMPTION L/100KM                        19.30                               15.88

COMPOSITE RESULTS
   TEST NUMBER           733-11                                           3-BAG       (4-BAG)
   BAROMETER     MM HG   748.0      CARBON DIOXIDE        G/KM            374.1      ( 371.0)
   HUMIDITY      G/KG      5.5      FUEL CONSUMPTION      L/100KM         17.52      ( 17.35)
   TEMPERATURE   DEG C    24.4      HYDROCARBONS (THC)    G/KM             2.09      (  2.06)
                                    CARBON MONOXIDE       G/KM            18.90      ( 18.42)
                                    OXIDES OF NITROGEN    G/KM             2.58      (  2.55)
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                                         VEHICLE EMISSIONS RESULTS  - UNMODIFIED
                                          PROJECT 11-5830-004

TEST NO.   733-1    RUN   1                 VEHICLE NO.73
VEHICLE MODEL   70 CHEV MONTECARLO          DATE   12/19/80                 TEST WEIGHT  1814. KG( 4000. LBS)
ENGINE 5.7 L(350. CID) V-8                  BAG CART NO.  1                 ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
TRANSMISSION A3                             DYNO NO.      3                 GASOLINE  EM-433-F
                                            CVS NO.   2                     ODOMETER ****** KM(86627. MILES)

BAROMETER 749.30 MM HG(29.50 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  27. PCT                  ABS. HUMIDITY  5.3 GM/KG        NOX HUMIDITY CORRECTION FACTOR   .85
BAG RESULTS
  TEST CYCLE                                  SET                    HFET

  BLOWER DIF P MM. H2O(IN. H2O)            774.7 (30.5)           762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)          762.0 (30.0)           749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)           43.3 (110.0)
  BLOWER REVOLUTIONS                         111973.                 61314.
  TOT FLOW STD. CU. METRES(SCF)            212.2 ( 7494.)         116.4 ( 4109.)
  HC   SAMPLE METER/RANGE/PPM              21.8/ 3/ 218.          31.5/ 3/ 315.
  HC   BCKGRD METER/RANGE/PPM               1.0/ 3/  10.           1.2/ 3/  12.
  CO   SAMPLE METER/RANGE/PPM              88.1/11/ 426.          27.5/ 3/ 640.
  CO   BCKGRD METER/RANGE/PPM                .1/11/   0.            .1/ 3/   2.
  CO2  SAMPLE METER/RANGE/PCT              85.6/ 3/ 1.59          44.1/ 2/ 1.92
  CO2  BCKGRD METER/RANGE/PCT               3.0/ 3/  .05           1.5/ 2/  .05
  NOX  SAMPLE METER/RANGE/PPM              66.8/ 3/ 200.          31.2/ 4/ 312.
  NOX  BCKGRD METER/RANGE/PPM                .4/ 3/   1.            .1/ 4/   1.
  DILUTION FACTOR                             8.13                   6.64
  HC   CONCENTRATION PPM                     209.                   305.
  CO   CONCENTRATION PPM                     409.                   609.
  CO2  CONCENTRATION PCT                    1.55                   1.88
  NOX  CONCENTRATION PPM                   199.3                  311.2
  HC   MASS GRAMS                          25.60                  20.45
  CO   MASS GRAMS                         100.96                  82.57
  CO2  MASS GRAMS                         6006.9                 4004.5
  NOX  MASS GRAMS                          68.65                  59.47
  RUN TIME               SECONDS           1397.                   765.
       DFC, WET (DRY)                    .877 ( .869)           .849 ( .843)
       SCF, WET (DRY)                   1.000 ( .977)          1.000 ( .975)
       VOL (SCM)                           212.2                  116.4
       SAM BLR (SCM)                        0.00                   0.00
       KM  (MEASURED)                      21.66                  16.46

  TEST NUMBER,                            733-12                 733-13
  BAROMETER,             MM HG             749.3                  749.0
  HUMIDITY,              G/KG                5.3                    5.7
  TEMPERATURE,           DEG C              25.0                   28.3
   CARBON DIOXIDE,        G/KM             277.3                  243.3
  FUEL CONSUMPTION,      L/100KM           12.31                  10.89

  HYDROCARBONS,          G/KM               1.18                   1.24
  CARBON MONOXIDE,       G/KM               4.66                   5.02
  OXIDES OF NITROGEN,    G/KM               3.17                   3.61
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TABLE D-24. TEST 731 EMISSIONS RESULTS

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                                FTP   VEHICLE EMISSIONS RESULTS  - RICH BEST IDLE W/O VAC. ADV.
                                       PROJECT 11-5830-004

TEST NO.   731-2    RUN   1             VEHICLE NO.73                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 CHEV MONTECARLO      DATE   12/ 8/80                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8              BAG CART NO.  1                    GASOLINE  EM-433 F
TRANSMISSION A3                         DYNO NO.      3                    ODOMETER ****** KM(86627. MILES)
                                        CVS NO.   2

BAROMETER 737.11 MM HG(29.02 IN HG)     DRY BULB TEMP. 27.8 DEG C(82.0 DEG F)
RELATIVE HUMIDITY  62. PCT              ABS. HUMIDITY 15.0 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.16
BAG RESULTS
   BAG NUMBER                                  1                  2                  3                   4
   DESCRIPTION                          COLD TRANSIENT      STABILIZED       HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)        762.0 (30.0)       762.0 (30.0)       762.0 (30.0)        762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)      762.0 (30.0)       762.0 (30.0)       762.0 (30.0)        762.0 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)     43.9 (111.0)       43.3 (110.0)       43.3 (110.0)        43.3 (110.0)
   BLOWER REVOLUTIONS                      40589.             69702.             40531.              69603.
   TOT FLOW STD. CU. METRES(SCF)         75.5 ( 2667.)     129.8 ( 4584.)      75.5 ( 2665.)      129.6 ( 4577.)
   HC   SAMPLE METER/RANGE/PPM          37.0/ 3/ 370.      18.8/ 3/ 188.      23.2/ 3/ 232.       18.4/ 3/ 184.
   HC   BCKGRD METER/RANGE/PPM           1.4/ 3/  14.       1.5/ 3/  15.       1.8/ 3/  18.        1.7/ 3/  17.
   CO   SAMPLE METER/RANGE/PPM          77.0/ 2/4337.      73.6/ 3/1940.      60.7/ 3/1532.       68.6/ 3/1777.
   CO   BCKGRD METER/RANGE/PPM            .1/ 2/   4.        .1/ 3/   2.        .1/ 3/   2.         .3/ 3/   7.
   CO2  SAMPLE METER/RANGE/PCT          88.6/ 3/ 1.65      41.6/ 3/ 1.09      82.9/ 3/ 1.53       59.2/ 3/ 1.05
   CO2  BCKGRD METER/RANGE/PCT           4.6/ 3/  .07       5.7/ 3/  .09       3.0/ 3/  .08        4.6/ 3/  .07
   NOX  SAMPLE METER/RANGE/PPM          67.6/ 2/  68.      25.1/ 2/  25.      68.1/ 2/  68.       26.7/ 2/  27.
   NOX  BCKGRD METER/RANGE/PPM            .6/ 2/   1.        .5/ 2/   1.        .5/ 2/   1.         .6/ 2/   1.
   DILUTION FACTOR                          6.38              10.31               7.89               10.84
   HC   CONCENTRATION PPM                   350.               174.               216.                169.
   CO   CONCENTRATION PPM                  4129.              1858.              1454.               1699.
   CO2  CONCENTRATION PCT                   1.59               1.02               1.46                 .98
   NOX  CONCENTRATION PPM                   67.1               24.6               67.7                26.2
   HC   MASS GRAMS                         15.60              13.06               9.41               12.60
   CO   MASS GRAMS                        363.00             280.86             127.78              256.42
   CO2  MASS GRAMS                        2197.5             2413.3             2021.4              2332.5
   NOX  MASS GRAMS                         11.27               7.11              11.36                7.54

   HC   GRAMS/KM                            2.69               2.11               1.63                2.05
   CO   GRAMS/KM                           62.67              45.39              22.17               41.63
   CO2  GRAMS/KM                           379.4              390.0              350.7               378.7
   NOX  GRAMS/KM                            1.95               1.15               1.97                1.22
   FUEL CONSUMPTION BY CB L/100KM          20.76              19.98              16.68               19.23

   RUN TIME                 SECONDS         505.               868.               505.                868.
   MEASURED DISTANCE        KM              5.79               6.19               5.76                6.16
          DFC, WET (DRY)                            .881 ( .863)                        .895 ( .877)
          SCF, WET (DRY)                           1.000 ( .968)                       1.000 ( .969)
          VOL (SCM)                                      205.3                               205.1
          SAM BLR (SCM)                                   0.00                                0.00
          KM  (MEASURED)                                 11.98                               11.92
          FUEL CONSUMPTION L/100KM                       20.36                               18.00

                                                                                            3-BAG        (4-BAG)
COMPOSITE RESULTS                                          CARBON DIOXIDE         G/KM       377.0       ( 373.6)
   TEST NUMBER            731-21                           FUEL CONSUMPTION       L/100KM    19.23       ( 19.01)
   BAROMETER      MM HG   737.1                            HYDROCARBONS (THC)     G/KM        2.10       (  2.08)
   HUMIDITY       G/KG     15.0                            CARBON MONOXIDE        G/KM       42.60       ( 41.48)
   TEMPERATURE    DEG C    27.8                            OXIDES OF NITROGEN     G/KM        1.54       (  1.56)
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                                       VEHICLE EMISSIONS RESULTS  - RICH BEST IDLE W/O VAC. ADV.
                                        PROJECT 11-5830-004

TEST NO.   731-2    RUN   1             VEHICLE NO.73                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 CHEV MONTECARLO      DATE   12/ 8/80                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 5.7 L(350. CID) V-8              BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                         DYNO NO.      3                    ODOMETER ****** KM(86627. MILES)
                                        CVS NO.   2

BAROMETER 737.11 MM HG(29.02 IN HG)     DRY BULB TEMP. 30.6 DEG C(87.0 DEG F)
RELATIVE HUMIDITY  43. PCT              ABS. HUMIDITY 12.1 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.05
BAG RESULTS
   TEST CYCLE                              SET                  HFET

   BLOWER DIF P MM. H2O(IN. H2O)        774.7 (30.5)        774.7 (30.5)
   BLOWER INLET P MM. H2O(IN. H2O)      774.7 (30.5)        774.7 (30.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)     43.3 (110.0)        43.3 (110.0)
   BLOWER REVOLUTIONS                     112093.              61395.
   TOT FLOW STD. CU. METRES(SCF)        208.4 ( 7357.)      114.0 ( 4025.)
   HC   SAMPLE METER/RANGE/PPM          19.0/ 3/ 190.       20.2/ 3/ 202.
   HC   BCKGRD METER/RANGE/PPM           1.8/ 3/  18.        1.8/ 3/  18.
   CO   SAMPLE METER/RANGE/PPM          55.8/ 3/1387.       44.1/ 3/1062.
   CO   BCKGRD METER/RANGE/PPM            .3/ 3/   7.         .1/ 3/   2.
   CO2  SAMPLE METER/RANGE/PCT          91.6/ 3/ 1.71       50.9/ 2/ 2.29
   CO2  BCKGRD METER/RANGE/PCT           4.7/ 3/  .07        1.9/ 2/  .07
   NOX  SAMPLE METER/RANGE/PPM          91.7/ 2/  92.       48.4/ 3/ 145.
   NOX  BCKGRD METER/RANGE/PPM            .7/ 2/   1.         .2/ 3/   1.
   DILUTION FACTOR                          7.19                5.56
   HC   CONCENTRATION PPM                   175.                187.
   CO   CONCENTRATION PPM                  1317.               1000.
   CO2  CONCENTRATION PCT                   1.65                2.23
   NOX  CONCENTRATION PPM                   91.1               144.7
   HC   MASS GRAMS                         20.97               12.31
   CO   MASS GRAMS                        319.39              132.75
   CO2  MASS GRAMS                        6292.7              4660.7
   NOX  MASS GRAMS                         38.03               31.63
   RUN TIME                 SECONDS        1399.                766.
          DFC, WET (DRY)                 .861 ( .849)        .820 ( .810)
          SCF, WET (DRY)                1.000 ( .970)       1.000 ( .966)
          VOL (SCM)                        208.4               114.0
          SAM BLR (SCM)                     0.00                0.00
          KM  (MEASURED)                   21.74               16.48

    TEST NUMBER,                          731-22              731-23
    BAROMETER,              MM HG          737.1               736.3
    HUMIDITY,               G/KG            12.1                10.8
    TEMPERATURE,            DEG C           30.6                30.0
     CARBON DIOXIDE,         G/KM          289.4               202.9
    FUEL CONSUMPTION,       L/100KM        13.47               12.71

    HYDROCARBONS,           G/KM             .96                 .75
    CARBON MONOXIDE,        G/KM           14.69                8.06
    OXIDES OF NITROGEN,     G/KM            1.75                1.92
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TABLE D-25. TEST 741 EMISSIONS RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                           PROJECT 11-5830-004

TEST NO.   741-1    RUN   1                     VEHICLE NO.74                  TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD               DATE     9/23/80               ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8                      BAG CART NO.  1                GASOLINE  EM-433-F
TRANSMISSION A3                                 DYNO NO.      1                ODOMETER ****** KM(65740. MILES)
                                                CVS NO.   2

BAROMETER 740.92 MM HG(29.17 IN HG)             DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  63. PCT                      ABS. HUMIDITY 12.9 GM/KG       NOX HUMIDITY CORRECTION FACTOR  1.08
BAG RESULTS
  BAG NUMBER                                        1                  2                  3                  4
  DESCRIPTION                                COLD TRANSIENT      STABILIZED       HOT TRANSIENT       STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)             812.8 (32.0)       812.8 (32.0)       812.8 (32.0)       817.9 (32.2)
   BLOWER INLET P MM. H2O(IN. H2O)           741.7 (29.2)       749.3 (29.5)       736.6 (29.0)       736.6 (29.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)          42.2 (108.0)       42.2 (108.0)       41.7 (107.0)       43.3 (110.0)
   BLOWER REVOLUTIONS                           40476.             69460.             40413.             69374.
   TOT FLOW STD. CU. METRES(SCF)              76.0 ( 2683.)      130.3 ( 4601.)      76.0 ( 2683.)     130.1 ( 4593.)
   HC  SAMPLE METER/RANGE/PPM                48.4/ 3/ 484.      19.9/ 3/ 199.      34.3/ 3/ 343.      20.3/ 3/ 203.
   HC  BCKGRD METER/RANGE/PPM                 1.9/ 3/  19.       1.8/ 3/  18.       2.0/ 3/  20.       1.9/ 3/  19.
   CO  SAMPLE METER/RANGE/PPM                57.0/ 2/2099.      96.2/12/ 242.      22.6/ 3/ 522.      87.5/12/ 220.
   CO  BCKGRD METER/RANGE/PPM                  .2/ 2/   8.       2.9/12/   5.        .1/ 3/   2.       2.7/12/   5.
   CO2 SAMPLE METER/RANGE/PCT                83.0/ 3/ 1.53      59.5/ 3/ 1.03      78.7/ 3/ 1.44      59.0/ 3/ 1.04
   CO2 BCKGRD METER/RANGE/PCT                 4.2/ 3/  .06       4.9/ 3/  .08       4.0/ 3/  .06       4.7/ 3/  .07
   NOX SAMPLE METER/RANGE/PPM                45.9/ 3/ 138.      79.8/ 2/  80.      64.9/ 3/ 195.      90.5/ 2/  91.
   NOX BCKGRD METER/RANGE/PPM                  .3/ 3/   1.       1.2/ 2/   1.        .4/ 3/   1.       1.5/ 2/   2.
   DILUTION FACTOR                              7.22               12.22               8.78              12.36
   HC  CONCENTRATION PPM                       468.                182.                325.               186.
   CO  CONCENTRATION PPM                      2747.                228.                495.               206.
   CO2 CONCENTRATION PCT                       1.48                 .98               1.39                .98
   NOX CONCENTRATION PPM                      136.9                78.7              193.6               89.1
   HC  MASS GRAMS                             20.49               13.71              14.25              13.91
   CO  MASS GRAMS                            243.06               34.55              43.75              31.22
   CO2 MASS GRAMS                            2054.1              2347.0             1931.5             2325.7
   NOX MASS GRAMS                             21.42               21.12              30.30              23.87

   HC  GRAMS/KM                                3.51                2.18               2.46               2.22
   CO  GRAMS/KM                               41.63                5.50               7.56               4.99
   CO2 GRAMS/KM                               351.8               373.6              334.0              371.7
   NOX GRAMS/KM                                3.67                3.36               5.24               3.81
   FUEL CONSUMPTION BY CB L/100KM             18.28               16.61              15.10              16.50

   RUN TIME               SECONDS             505.                867.               505.               868.
   MEASURED DISTANCE      KM                  5.84                6.28               5.78               6.26
        DFC, WET (DRY)                                 .897 ( .879)                          .907 ( .888)
        SCF, WET (DRY)                               1.000 ( .968)                         1.000 ( .969)
        VOL (SCM)                                            206.3                                 206.1
        SAM BLR (SCM)                                         0.00                                  0.00
        KM  (MEASURED)                                       12.12                                 12.04
        FUEL CONSUMPTION L/100KM                             17.42                                 15.83

COMPOSITE RESULTS                                                                          3-BAG        (4-BAG)
   TEST NUMBER             741-11                         CARBON DIOXIDE         G/KM      338.2       ( 357.7)
   BAROMETER      MM HG    740.9                          FUEL CONSUMPTION       L/100KM    16.54      ( 16.51)
   HUMIDITY       G/KG      12.9                          HYDROCARBONS (THC)     G/KM        2.53      (  2.55)
   TEMPERATURE    DEG C     25.0                          CARBON MONOXIDE        G/KM       13.55      ( 13.40)
                                                          OXIDES OF NITROGEN     G/KM        3.94      (  4.07)
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                                          VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                           PROJECT 11-5830-004

TEST NO.   741-1    RUN   1                     VEHICLE NO.74                  TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD               DATE     9/23/80               ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8                      BAG CART NO.  1                GASOLINE  EM-433-F
TRANSMISSION A3                                 DYNO NO.      1                ODOMETER ****** KM(65760. MILES)
                                                CVS NO.   2

BAROMETER 740.92 MM HG(29.17 IN HG)             DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  49. PCT                      ABS. HUMIDITY  9.9 GM/KG       NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
  TEST CYCLE                                     SET                      HFET

  BLOWER DIF P MM. H2O(IN. H2O)              812.8 (32.0)             812.8 (32.0)
  BLOWER INLET P MM. H2O(IN. H2O)            741.7 (29.2)             741.7 (29.2)
  BLOWER INLET TEMP. DEG. C(DEG. F)           42.8 (109.0)             43.3 (110.0)
  BLOWER REVOLUTIONS                           111751.                   61224.
  TOT FLOW STD. CU. METRES(SCF)              209.6 ( 7400.)           114.7 ( 4050.)
  HC  SAMPLE METER/RANGE/PPM                 33.7/ 3/ 337.            46.2/ 3/ 462.
  HC  BCKGRD METER/RANGE/PPM                  1.9/ 3/  19.             1.9/ 3/  19.
  CO  SAMPLE METER/RANGE/PPM                 25.7/ 3/ 596.            33.6/ 3/ 791.
  CO  BCKGRD METER/RANGE/PPM                   .3/ 3/   7.              .1/ 3/   2.
  CO2 SAMPLE METER/RANGE/PCT                 80.6/ 3/ 1.65            46.0/ 2/ 2.06
  CO2 BCKGRD METER/RANGE/PCT                  3.7/ 3/  .06             1.5/ 2/  .05
  NOX SAMPLE METER/RANGE/PPM                 85.1/ 3/ 255.            35.9/ 4/ 359.
  NOX BCKGRD METER/RANGE/PPM                   .6/ 3/   2.              .2/ 4/   2.
  DILUTION FACTOR                                7.70                     6.15
  HC  CONCENTRATION PPM                        320.                     446.
  CO  CONCENTRATION PPM                        562.                     745.
  CO2 CONCENTRATION PCT                        1.60                     2.01
  NOX CONCENTRATION PPM                       253.7                    357.3
  HC  MASS GRAMS                              38.73                    29.51
  CO  MASS GRAMS                             137.12                    99.45
  CO2 MASS GRAMS                             6137.4                   4230.0
  NOX MASS GRAMS                              99.17                    78.85
  RUN TIME               SECONDS              1397.                     764.
       DFC, WET (DRY)                        .870 ( .856)             .837 ( .824)
       SCF, WET (DRY)                       1.000 ( .969)            1.000 ( .965)
       VOL (SCM)                                209.6                    114.7
       SAM BLR (SCM)                             0.00                     0.00
       KM  (MEASURED)                           21.65                    16.46

  TEST NUMBER,                                 741-12                   741-13
  BAROMETER,             MM HG                 740.9                    740.9
  HUMIDITY,              G/KG                    9.9                     10.9
  TEMPERATURE,           DEG C                  25.0                     26.1
   CARBON DIOXIDE,        G/KM                 283.5                    256.9
  FUEL CONSUMPTION,      L/100KM               12.77                    11.61

  HYDROCARBONS,          G/KM                   1.79                     1.79
  CARBON MONOXIDE,       G/KM                   6.33                     6.04
  OXIDES OF NITROGEN,    G/KM                   4.58                     4.79
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TABLE D-26. TEST 741 EMISSIONS RESULTS

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                                    FTP   VEHICLE EMISSIONS RESULTS- RICH BEST IDLE
                                            PROJECT 11-5830-004

TEST NO.    741-2    RUN   1                 VEHICLE NO.74                       TEST WEIGHT  1014. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD            DATE     9/25/80                    ACTUAL ROAD LOAD    8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8                   BAG CART NO.  1                     GASOLINE  EM-433-F
TRANSMISSION A3                              DYNO NO.      3                     ODOMETER ###### KM(65825. MILES)
                                             CVS NO.   2

BAROMETER 739.90 MM HG(29.13 IN HG)          DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  57. PCT                   ABS. HUMIDITY 11.9 GM/KG            NOX HUMIDITY CORRECTION FACTOR  1.04
BAG RESULTS
  BAG NUMBER                                        1               2                 3                4
  DESCRIPTION                                COLD TRANSIENT    STABILIZED       HOT TRANSIENT      STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)              817.9 (32.2)      825.5 (32.5)     812.8 (32.0)      817.9 (32.2)
  BLOWER INLET P MM. H2O(IN. H2O)            749.3 (29.5)      762.0 (30.0)     736.6 (29.0)      749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)           41.1 (106.0)      40.0 (104.0)     43.3 (110.0)      43.3 (110.0)
  BLOWER REVOLUTIONS                            40442.            69451.           40672.            69447.
  TOT FLOW STD. CU. METRES(SCF)               75.9 ( 2680.)    130.4 ( 4604.)    76.1 ( 2688.)    129.8 ( 4583.)
  HC   SAMPLE METER/RANGE/PPM                58.6/ 3/ 586.     34.8/ 3/ 348.    42.2/ 3/ 422.     32.3/ 3/ 323.
  HC   BCKGRD METER/RANGE/PPM                 2.1/ 3/  21.      2.0/ 3/  20.     2.0/ 3/  20.      2.2/ 3/  22.
  CO   SAMPLE METER/RANGE/PPM                78.8/ 2/4511.     58.6/ 2/2953.    81.8/ 3/2225.     90.9/ 3/2567.
  CO   BCKGRD METER/RANGE/PPM                  .3/ 2/  11.       .2/ 2/   8.      .8/ 3/  18.       .6/ 3/  14.
  CO2  SAMPLE METER/RANGE/PCT                78.6/ 3/ 1.44     51.9/ 3/  .90    74.7/ 3/ 1.36     53.5/ 3/  .93
  CO2  BCKGRD METER/RANGE/PCT                 4.8/ 3/  .07      4.5/ 3/  .07     4.3/ 3/  .07      4.6/ 3/  .07
  NOX  SAMPLE METER/RANGE/PPM                44.3/ 3/ 133.     47.1/ 2/  47.    61.4/ 3/ 184.     80.2/ 2/  80.
  NOX  BCKGRD METER/RANGE/PPM                  .6/ 3/   2.      1.1/ 2/   1.      .4/ 3/   1.      1.6/ 2/   2.
  DILUTION FACTOR                                6.94             10.95             8.30             11.03
  HC   CONCENTRATION PPM                        568.              330.             404.              303.
  CO   CONCENTRATION PPM                       4294.             2841.            2110.             2462.
  CO2  CONCENTRATION PCT                        1.38              .84             1.30               .87
  NOX  CONCENTRATION PPM                       131.4              66.1            103.1              78.7
  HC   MASS GRAMS                              24.84             24.80            17.75             22.60
  CO   MASS GRAMS                             379.38            431.21           187.02            372.03
  CO2  MASS GRAMS                             1914.0            2007.5           1815.1            2069.1
  NOX  MASS GRAMS                              19.84             17.15            27.74             20.34

  HC   GRAMS/KM                                 4.26              3.95             3.07              3.64
  CO   GRAMS/KM                                64.95             68.64            32.29             59.67
  CO2  GRAMS/KM                                327.7             319.5            313.4             331.9
  NOX  GRAMS/KM                                 3.40              2.73             4.79              3.26
  FUEL CONSUMPTION BY CB L/100KM               18.92             18.78            15.96             18.66

  RUN TIME               SECONDS                504.              867.             508.              866.
  MEASURED DISTANCE      KM                     5.84              6.28             5.79              6.23
       DFC, WET (DRY)                                  .889 ( .873)                       .898 ( .882)
       SCF, WET (DRY)                                 1.000 ( .972)                      1.000 ( .972)
       VOL (SCM)                                            206.3                              205.9
       SAM BLR (SCM)                                         0.00                               0.00
       KM  (MEASURED)                                       12.12                              12.03
       FUEL CONSUMPTION L/100KM                             18.84                              17.36

COMPOSITE RESULTS                                                                             3-BAG       (4-BAG)
    TEST NUMBER              741-21                          CARBON DIOXIDE       G/KM        319.5      ( 323.2)
    BAROMETER      MM HG     739.9                           FUEL CONSUMPTION     L/100KM     18.04      ( 18.00)
    HUMIDITY       G/KG       11.9                           HYDROCARBONS (THC)   G/KM         3.77      (  3.68)
    TEMPERATURE    DEG C      25.6                           CARBON MONOXIDE      G/KM        57.94      ( 55.25)
                                                             OXIDES OF NITROGEN   G/KM         3.43      (  3.59)
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                                         VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                                           PROJECT 11-5830-004

TEST NO.    741-2    RUN   1                 VEHICLE NO.74                       TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD            DATE     9/25/80                    ACTUAL ROAD LOAD    6.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8                   BAG CART NO.  1                     GASOLINE  EM-433-F
TRANSMISSION A3                              DYNO NO.      3                     ODOMETER ###### KM(65839. MILES)
                                             CVS NO.   2

BAROMETER 740.16 MM HG(29.14 IN HG)          DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
RELATIVE HUMIDITY  53. PCT                   ABS. HUMIDITY 11.1 GM/KG            NOX HUMIDITY CORRECTION FACTOR  1.01
BAG RESULTS
  TEST CYCLE                                      SET                    HFET

  BLOWER DIF P MM. H2O(IN. H2O)              812.8 (32.0)            817.9 (32.2)
  BLOWER INLET P MM. H2O(IN. H2O)            736.6 (29.0)            741.7 (29.2)
  BLOWER INLET TEMP. DEG. C(DEG. F)           43.9 (111.0)            38.3 (101.0)
  BLOWER REVOLUTIONS                           111705.                  61259.
  TOT FLOW STD. CU. METRES(SCF)              209.0 ( 7379.)          115.7 ( 4086.)
  HC   SAMPLE METER/RANGE/PPM                40.7/ 3/ 407.           45.6/ 3/ 456.
  HC   BCKGRD METER/RANGE/PPM                 1.8/ 3/  18.            1.3/ 3/  13.
  CO   SAMPLE METER/RANGE/PPM                73.7/ 3/1943.           49.2/ 3/1201.
  CO   BCKGRD METER/RANGE/PPM                 1.0/ 3/  23.             .2/ 3/   5.
  CO2  SAMPLE METER/RANGE/PCT                88.1/ 3/ 1.64           44.4/ 2/ 1.97
  CO2  BCKGRD METER/RANGE/PCT                 4.2/ 3/  .06            1.4/ 2/  .05
  NOX  SAMPLE METER/RANGE/PPM                87.1/ 3/ 261.           32.5/ 4/ 325.
  NOX  BCKGRD METER/RANGE/PPM                  .6/ 3/   2.             .1/ 4/   1.
  DILUTION FACTOR                                7.19                    6.29
  HC   CONCENTRATION PPM                        392.                    445.
  CO   CONCENTRATION PPM                       1830.                   1130.
  CO2  CONCENTRATION PCT                        1.58                    1.93
  NOX  CONCENTRATION PPM                       259.8                   324.2
  HC   MASS GRAMS                              47.17                   29.69
  CO   MASS GRAMS                             445.13                  152.16
  CO2  MASS GRAMS                             6055.9                  4088.7
  NOX  MASS GRAMS                             105.31                   74.62
  RUN TIME               SECONDS               1396.                    765.
       DFC, WET (DRY)                        .861 ( .846)            .841 ( .826)
       SCF, WET (DRY)                       1.000 ( .968)           1.000 ( .963)
       VOL (SCM)                                209.0                   115.7
       SAM BLR (SCM)                             0.00                    0.00
       KM  (MEASURED)                           21.62                   16.43

  TEST NUMBER,                                 741-22                  741-23
  BAROMETER,             MM HG                  740.2                   740.2
  HUMIDITY,              G/KG                    11.1                    11.9
  TEMPERATURE,           DEG C                   25.6                    25.6
   CARBON DIOXIDE,        G/KM                  280.1                   248.8
  FUEL CONSUMPTION,      L/100KM                13.63                   11.49

  HYDROCARBONS,          G/KM                    2.18                    1.81
  CARBON MONOXIDE,       G/KM                   20.59                    9.26
  OXIDES OF NITROGEN,    G/KM                    4.87                    4.34
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TABLE D-27. TEST 741 EMISSIONS RESULTS

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                    FTP    VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                             PROJECT 11-5330-004

TEST NO.   741-3    RUN   1                 VEHICLE NO.74                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD           DATE     9/29/80                   ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8                  BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                             DYNO NO.      3                    ODOMETER ****** KM(65085. MILES)
                                            CVS NO.   2

BAROMETER 739.39 MM HG(29.11 IN HG)         DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  60. PCT                  ABS. HUMIDITY 12.1 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.05
BAG RESULTS
  BAG NUMBER                                      1                  2                  3                  4
  DESCRIPTION                              COLD TRANSIENT       STABILIZED        HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)            741.7 (29.2)        762.0 (30.0)       749.3 (29.5)       756.9 (29.8)
  BLOWER INLET P MM. H2O(IN. H2O)          731.5 (28.8)        749.3 (29.5)       736.6 (29.0)       741.7 (29.2)
  BLOWER INLET TEMP. DEG. C(DEG. F)         43.9 (111.0)        43.3 (110.0)       42.2 (108.0)       43.3 (110.0)
  BLOWER REVOLUTIONS                          40378.              69598.             40498.             69545.
  TOT FLOW STD. CU. METRES(SCF)             76.1 ( 2686.)      130.2 ( 4599.)      76.1 ( 2686.)     130.3 ( 4600.)
  HC   SAMPLE METER/RANGE/PPM               58.5/ 3/ 585.       34.3/ 3/ 343.      41.2/ 3/ 412.      31.7/ 3/ 317.
  HC   BCKGRD METER/RANGE/PPM                3.3/ 3/  33.        3.4/ 3/  34.       3.6/ 3/  36.       3.1/ 3/  31.
  CO   SAMPLE METER/RANGE/PPM               78.3/ 2/4468.       60.8/ 2/3105.      83.7/ 3/2274.      96.6/ 3/2798.
  CO   BCKGRD METER/RANGE/PPM                 .3/ 2/  11.         .4/ 2/  15.        .6/ 3/  14.        .6/ 3/  14.
  CO2  SAMPLE METER/RANGE/PCT               77.0/ 3/ 1.41       51.1/ 3/  .89      73.0/ 3/ 1.33      52.7/ 3/  .92
  CO2  BCKGRD METER/RANGE/PCT                4.4/ 3/  .07        4.6/ 3/  .07       4.1/ 3/  .06       4.1/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM               39.0/ 3/ 117.       63.7/ 2/  64.      55.7/ 3/ 167.      72.6/ 2/  73.
  NOX  BCKGRD METER/RANGE/PPM                 .1/ 3/   0.         .9/ 2/   1.        .2/ 3/   1.       1.0/ 2/   1.
  DILUTION FACTOR                               7.00               10.95               8.45              10.98
  HC   CONCENTRATION PPM                        557.                330.               380.               289.
  CO   CONCENTRATION PPM                       4251.               2979.              2179.              2683.
  CO2  CONCENTRATION PCT                        1.35                 .82               1.27                .86
  NOX  CONCENTRATION PPM                       116.7                62.9              166.6               71.2
  HC   MASS GRAMS                              24.42               24.80              16.68              21.70
  CO   MASS GRAMS                             376.49              451.69             193.00             406.82
  CO2  MASS GRAMS                             1879.6              1965.1             1768.7             2056.3
  NOX  MASS GRAMS                              17.82               16.44              25.43              18.74

  HC   GRAMS/KM                                 4.23                3.97               2.89               3.43
  CO   GRAMS/KM                                65.10               72.30              33.43              64.40
  CO2  GRAMS/KM                                325.4               314.6              306.3              325.5
  NOX  GRAMS/KM                                 3.09                2.63               4.40               2.97
  FUEL CONSUMPTION BY CB L/100KM               18.83               18.81              15.71              18.68

  RUN TIME                   SECONDS            505.                867.               505.               867.
  MEASURED DISTANCE          KM                 5.70                6.25               5.77               6.32
       DFC, WET (DRY)                                  .890 ( .873)                           .899 ( .882)
       SCF, WET (DRY)                                 1.000 ( .971)                          1.000 ( .971)
       VOL (SCM)                                             206.3                                  206.3
       SAM BLR (SCM)                                          0.00                                   0.00
       KM  (MEASURED)                                        12.02                                  12.09
       FUEL CONSUMPTION L/100KM                              18.82                                  17.26

COMPOSITE RESULTS
   TEST NUMBER              741-31
   BARODMETER      MM HG    739.4
   HUMIDITY        G/KG      12.1
   TEMPERATURE     DEG C     25.0

                                                        3-BAG       (4-BAG)
   CARBON DIOXIDE          G/KM                         314.5      ( 317.8)
   FUEL CONSUMPTION        L/100KM                      17.97      ( 17.93)
   HYDROCARBONS (THC)      G/KM                          3.73      (  3.57)
   CARBON MONOXIDE         G/KM                         60.19      ( 57.90)
   OXIDES OF NITROGEN      G/KM                          3.21      (  3.31)
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                           VEHICLE EMISSIONS RESULTS - RICH BEST IDLE
                             PROJECT 11-5830-004

TEST NO.   741-3    RUN   1                 VEHICLE NO.74
VEHICLE MODEL   70 FAIRLANE  FORD           DATE     9/29/80                   TEST WEIGHT  1814. KG( 4000. LBS)
ENGINE 0.0 L(  0. CID) V-8                  BAG CART NO.  1                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
TRANSMISSION A3                             DYNO NO.      3                    GASOLINE  EM-433-F
                                            CVS NO.   2                        ODOMETER ****** KM(65099. MILES)

BAROMETER 739.90 MM HG(29.13 IN HG)         DRY BULB TEMP. 26.1 DEG C(79.0 DEG F)
RELATIVE HUMIDITY  54. PCT                  ABS. HUMIDITY 11.7 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.03
BAG RESULTS
  TEST CYCLE                                   SET                       HFET

  BLOWER DIF P MM. H2O(IN. H2O)            762.0 (30.0)              762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)          749.3 (29.5)              736.6 (29.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)         43.3 (110.0)              43.3 (110.0)
  BLOWER REVOLUTIONS                         112026.                    61296.
  TOT FLOW STD. CU. METRES(SCF)            209.8 ( 7407.)            114.9 ( 4059.)
  HC   SAMPLE METER/RANGE/PPM               38.0/ 3/ 380.             43.0/ 3/ 430.
  HC   BCKGRD METER/RANGE/PPM                2.6/ 3/  26.              2.2/ 3/  22.
  CO   SAMPLE METER/RANGE/PPM               79.3/ 3/2136.             49.4/ 3/1206.
  CO   BCKGRD METER/RANGE/PPM                 .5/ 3/  11.               .4/ 3/   9.
  CO2  SAMPLE METER/RANGE/PCT               81.8/ 3/ 1.51             44.0/ 2/ 1.95
  CO2  BCKGRD METER/RANGE/PCT                3.9/ 3/  .06              1.5/ 2/  .05
  NOX  SAMPLE METER/RANGE/PPM               71.4/ 3/ 214.             30.3/ 4/ 303.
  NOX  BCKGRD METER/RANGE/PPM                 .4/ 3/   1.               .1/ 4/   1.
  DILUTION FACTOR                               7.66                      6.36
  HC   CONCENTRATION PPM                        357.                      411.
  CO   CONCENTRATION PPM                       2027.                     1136.
  CO2  CONCENTRATION PCT                        1.46                      1.91
  NOX  CONCENTRATION PPM                       213.2                     302.2
  HC   MASS GRAMS                              43.23                     27.27
  CO   MASS GRAMS                             495.04                    152.02
  CO2  MASS GRAMS                             5388.4                    4009.7
  NOX  MASS GRAMS                              88.24                     65.80
  RUN TIME                   SECONDS           1398.                      765.
       DFC, WET (DRY)                       .869 ( .854)              .843 ( .830)
       SCF, WET (DRY)                      1.000 ( .969)             1.000 ( .967)
       VOL (SCM)                               209.8                     114.9
       SAM BLR (SCM)                            0.00                      0.00
       KM  (MEASURED)                          21.47                     16.25

  TEST NUMBER,                                741-32                    741-33
  BAROMETER,                 MM HG             739.9                     739.9
  HUMIDITY,                  G/KG               11.7                      10.4
  TEMPERATURE,               DEG C              26.1                      27.2
   CARBON DIOXIDE,            G/KM             250.3                     246.8
  FUEL CONSUMPTION,          L/100KM           12.93                     11.39

  HYDROCARBONS,              G/KM               2.01                      1.60
  CARBON MONOXIDE,           G/KM              23.06                      9.36
  OXIDES OF NITROGEN,        G/KM               4.11                      4.05
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TABLE D-28. TEST 744 EMISSIONS RESULTS

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                              FTP    VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                      PROJECT 11-5830-004

TEST NO.   744-1    RUN  1                VEHICLE NO.74                   TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD         DATE   10/ 7/30                 ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8                BAG CART NO.  1                 GASOLINE  EM-433-F
TRANSMISSION A3                           DYNO NO.      3                 ODOMETER ###### KM(66145. MILES)
                                          CVS NO.   2

BAROMETER 748.03 MM HG(29.45 IN HG)       DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  48. PCT                ABS. HUMIDITY  8.9 GM/KG        NOX HUMIDITY CORRECTION FACTOR   .94
BAG RESULTS
  BAG NUMBER                                    1                  2                 3                  4
  DESCRIPTION                             COLD TRANSIENT      STABILIZED       HOT TRANSIENT       STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)           762.0 (30.0)       762.0 (30.0)      762.0 (30.0)       774.7 (30.5)
  BLOWER INLET P MM. H2O(IN. H2O)         749.3 (29.5)       749.3 (29.5)      749.3 (29.5)       756.9 (29.8)
  BLOWER INLET TEMP. DEG. C(DEG. F)        43.1 (109.5)       43.3 (110.0)      43.3 (110.0)       43.3 (110.0)
  BLOWER REVOLUTIONS                         40534.             69600.            40508.             69505.
  TOT FLOW STD. CU. METRES(SCF)            76.9 ( 2714.)     131.9 ( 4658.)     76.8 ( 2711.)     131.6 ( 4646.)
  HC   SAMPLE METER/RANGE/PPM             40.5/ 3/ 405.      18.4/ 3/ 184.     29.1/ 3/ 291.      17.4/ 3/ 174.
  HC   BCKGRD METER/RANGE/PPM              1.4/ 3/  14.       1.5/ 3/  15.      1.5/ 3/  15.       1.4/ 3/  14.
  CO   SAMPLE METER/RANGE/PPM             87.9/ 3/2431.      80.4/11/ 363.     86.0/11/ 408.      95.8/12/ 241.
  CO   BCKGRD METER/RANGE/PPM               .4/ 3/   9.       1.9/11/   6.      1.2/11/   3.       1.7/12/   3.
  CO2  SAMPLE METER/RANGE/PCT             79.9/ 3/ 1.47      56.2/ 3/  .99     75.7/ 3/ 1.38      56.2/ 3/  .99
  CO2  BCKGRD METER/RANGE/PCT              4.0/ 3/  .06       4.0/ 3/  .06      4.0/ 3/  .06       3.9/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM             49.7/ 3/ 149.      78.1/ 2/  78.     64.6/ 3/ 194.      84.4/ 2/  84.
  NOX  BCKGRD METER/RANGE/PPM               .2/ 3/   1.       1.0/ 2/   1.       .3/ 3/   1.       1.0/ 2/   1.
  DILUTION FACTOR                            7.69              12.87              9.25              13.03
  HC   CONCENTRATION PPM                     393.              170.               278.              161.
  CO   CONCENTRATION PPM                     2334.             348.               388.              230.
  CO2  CONCENTRATION PCT                     1.41               .93               1.33               .93
  NOX  CONCENTRATION PPM                     148.6             77.2              193.0              83.5
  HC   MASS GRAMS                            17.41             12.94              12.29              12.22
  CO   MASS GRAMS                            209.06            53.40              34.69              35.21
  CO2  MASS GRAMS                            1990.2            2249.2             1864.1             2246.4
  NOX  MASS GRAMS                            20.63             18.39              26.77              19.84

  HC   GRAMS/KM                              2.99              2.08               2.13               1.96
  CO   GRAMS/KM                              35.93             8.56               6.00               5.66
  CO2  GRAMS/KM                              342.0             360.7              322.5              361.0
  NOX  GRAMS/KM                              3.55              2.95               4.63               3.19
  FUEL CONSUMPTION BY CB L/100KM             17.41             16.25              14.46              16.05

  RUN TIME                 SECONDS           505.              867.               505.               867.
  MEASURED DISTANCE        KM                5.82              6.24               5.78               6.22
        DFC, WET (DRY)                           .903 ( .889)                         .912 ( .898)
        SCF, WET (DRY)                          1.000 ( .974)                        1.000 ( .974)
        VOL (SCM)                                      208.8                                208.3
        SAM BLR (SCM)                                   0.00                                 0.00
        KM  (MEASURED)                                 12.05                                12.00
        FUEL CONSUMPTION L/100KM                       16.81                                15.29

COMPOSITE RESULTS
  TEST NUMBER              744-1
  BAROMETER      MM HG     748.0                                                      3-BAG       (4-BAG)
  HUMIDITY       G/KG        8.9                      CARBON DIOXIDE       G/KM       346.4      ( 346.4)
  TEMPERATURE    DEG C      23.9                      FUEL CONSUMPTION     L/100KM    16.00      ( 15.94)
                                                      HYDROCARBONS (THC)   G/KM        2.28      (  2.25)
                                                      CARBON MONOXIDE      G/KM       13.54      ( 12.68)
                                                      OXIDES OF NITROGEN   G/KM        3.53      (  3.61)
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                                          VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                           PROJECT 11-5830-004

TEST NO.   744-1    RUN  1                VEHICLE NO.74
VEHICLE MODEL   70 FAIRLANE  FORD         DATE   10/ 7/80                 TEST WEIGHT  1814. KG( 4000. LBS)
ENGINE 0.0 L(  0. CID) V-8                BAG CART NO.  1                 ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
TRANSMISSION A3                           DYNO NO.      3                 GASOLINE  EM-433-F
                                          CVS NO.   2                     ODOMETER ###### KM(66159. MILES)

BAROMETER 747.78 MM HG(29.44 IN HG)       DRY BULB TEMP. 23.9 DEG C(75.0 DEG F)
RELATIVE HUMIDITY  48. PCT                ABS. HUMIDITY  8.9 GM/KG        NOX HUMIDITY CORRECTION FACTOR   .94
BAG RESULTS
  TEST CYCLE                                    SET                     HFET

  BLOWER DIF P MM. H2O(IN. H2O)           762.0 (30.0)            787.4 (31.0)
  BLOWER INLET P MM. H2O(IN. H2O)         749.3 (29.5)            762.0 (30.0)
  BLOWER INLET TEMP. DEG. C(DEG. F)        43.3 (110.0)            43.3 (110.0)
  BLOWER REVOLUTIONS                        111942.                 61358.
  TOT FLOW STD. CU. METRES(SCF)           212.1 ( 7489.)          116.0 ( 4095.)
  HC   SAMPLE METER/RANGE/PPM             27.8/ 3/ 278.           37.1/ 3/ 371.
  HC   BCKGRD METER/RANGE/PPM              1.4/ 3/  14.            1.6/ 3/  16.
  CO   SAMPLE METER/RANGE/PPM             98.9/11/ 525.           30.0/ 3/ 701.
  CO   BCKGRD METER/RANGE/PPM               .7/11/   2.             .1/ 3/   2.
  CO2  SAMPLE METER/RANGE/PCT             83.4/ 3/ 1.54           98.0/ 3/ 1.85
  CO2  BCKGRD METER/RANGE/PCT              3.8/ 3/  .06            3.6/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM             77.4/ 3/ 232.           29.6/ 4/ 296.
  NOX  BCKGRD METER/RANGE/PPM               .3/ 3/   1.             .1/ 4/   1.
  DILUTION FACTOR                            8.28                    6.87
  HC   CONCENTRATION PPM                     266.                    357.
  CO   CONCENTRATION PPM                     499.                    645.
  CO2  CONCENTRATION PCT                     1.49                    1.80
  NOX  CONCENTRATION PPM                     231.4                   295.1
  HC   MASS GRAMS                            32.49                   23.90
  CO   MASS GRAMS                            123.27                  89.77
  CO2  MASS GRAMS                            5781.8                  3820.6
  NOX  MASS GRAMS                            88.67                   60.94
  RUN TIME                 SECONDS           1397.                   766.
        DFC, WET (DRY)                    .879 ( .866)            .854 ( .843)
        SCF, WET (DRY)                   1.000 ( .970)           1.000 ( .959)
        VOL (SCM)                            212.1                   116.0
        SAM BLR (SCM)                        0.00                    0.00
        KM  (MEASURED)                       21.72                   16.40

  TEST NUMBER,                               744-1                   744-1
  BAROMETER,              MM HG              747.8                   747.8
  HUMIDITY,               G/KG               8.9                     8.5
  TEMPERATURE,            DEG C              23.9                    25.0
   CARBON DIOXIDE,         G/KM              266.2                   233.0
  FUEL CONSUMPTION,       L/100KM            11.94                   10.51

  HYDROCARBONS,           G/KM               1.50                    1.46
  CARBON MONOXIDE,        G/KM               5.67                    5.47
  OXIDES OF NITROGEN,     G/KM               4.08                    3.72
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TABLE D-29. TEST 742 EMISSIONS RESULTS

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                                FTP   VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE AND 10° RETARD
                                        PROJECT 11-5830-004
TEST NO.   742-2    RUN  1
VEHICLE MODEL   70 FAIRLANE  FORD      VEHICLE NO.74                          TEST WEIGHT  1814. KG( 4000. LBS)
ENGINE 0.0 L(  0. CID) V-8             DATE    9/19/80                        ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
TRANSMISSION A3                        BAG CART NO.  1                        GASOLINE  EM-433-F
                                       DYNO NO.      3                        ODOMETER ****** KM(62513. MILES)
                                       CVS NO.   2
BAROMETER 742.70 MM HG(29.24 IN HG)
RELATIVE HUMIDITY  64. PCT             DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
BAG RESULTS                            ABS. HUMIDITY 13.4 GM/KG               NOX HUMIDITY CORRECTION FACTOR  1.10
  BAG NUMBER                                 1                  2                   3                  4
  DESCRIPTION                          COLD TRANSIENT       STABILIZED         HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)        812.8 (32.0)       817.9 (32.2)        823.5 (32.5)       812.8 (32.0)
  BLOWER INLET P MM. H2O(IN. H2O)      736.6 (29.0)       741.7 (29.2)        749.3 (29.5)       741.7 (29.2)
  BLOWER INLET TEMP. DEG. C(DEG. F)     43.3 (110.0)       43.9 (111.0)        43.9 (111.0)       43.9 (111.0)
  BLOWER REVOLUTIONS                      40431.             69539.              40431.             69399.
  TOT FLOW STD. CU. METRES(SCF)         76.0 ( 2684.)     130.5 ( 4608.)       75.8 ( 2676.)     130.2 ( 4599.)
  HC   SAMPLE METER/RANGE/PPM          22.5/ 4/2250.      12.6/ 4/1260.       19.0/ 4/1900.      13.0/ 4/1300.
  HC   BCKGRD METER/RANGE/PPM            .1/ 4/  10.        .2/ 4/  20.         .1/ 4/  10.        .2/ 4/  20.
  CO   SAMPLE METER/RANGE/PPM          63.1/ 2/3269.      61.2/11/ 243.       40.9/ 3/ 978.      70.8/11/ 300.
  CO   BCKGRD METER/RANGE/PPM            .1/ 2/   4.        .6/11/   2.         .1/ 3/   2.       1.5/11/   4.
  CO2  SAMPLE METER/RANGE/PCT          82.4/ 3/ 1.52      61.6/ 3/ 1.09       79.9/ 3/ 1.47      60.9/ 3/ 1.08
  CO2  BCKGRD METER/RANGE/PCT           3.6/ 3/  .04       3.9/ 3/  .06        3.3/ 3/  .05       3.6/ 3/  .06
  NOX  SAMPLE METER/RANGE/PPM          37.5/ 3/ 113.      80.0/ 2/  80.       50.0/ 3/ 152.      82.3/ 2/  82.
  NOX  BCKGRD METER/RANGE/PPM            .2/ 3/   1.       1.4/ 2/   1.         .1/ 3/   0.       1.2/ 2/   1.
  DILUTION FACTOR                          6.52              10.77                7.65              10.81
  HC   CONCENTRATION PPM                2242.              1242.                1891.              1282.
  CO   CONCENTRATION PPM                3103.               231.                 928.               284.
  CO2  CONCENTRATION PCT                   1.49               1.04                 1.42               1.03
  NOX  CONCENTRATION PPM                 112.0               78.7                152.1               81.2
  HC   MASS GRAMS                         98.23              93.44                82.65              96.27
  CO   MASS GRAMS                        274.55              35.13                81.90              42.99
  CO2  MASS GRAMS                       2047.6             2486.0               1975.4             2450.0
  NOX  MASS GRAMS                         17.84              21.53                24.17              22.17

  HC   GRAMS/KM                           17.04              14.86                14.27              15.37
  CO   GRAMS/KM                           47.61               5.59                14.14               6.87
  CO2  GRAMS/KM                          358.6              395.4                341.0              392.5
  NOX  GRAMS/KM                            3.09               3.42                 4.17               3.54
  FUEL CONSUMPTION BY CB L/100KM          20.80              19.26                17.43              19.30

  RUN TIME                 SECONDS       504.               848.                 505.               867.
  MEASURED DISTANCE        KM              5.77               6.29                 5.79               4.26
        DFC, WET (DRY)                         .883 ( .867)                            .893 ( .873)
        SCF, WET (DRY)                        1.000 ( .968)                           1.000 ( .968)
        VOL (SCM)                                    206.5                                   206.0
        SAM BLR (SCM)                                  0.00                                    0.00
        KM  (MEASURED)                                12.05                                   12.06
        FUEL CONSUMPTION L/100KM                      20.00                                   18.40

COMPOSITE RESULTS
   TEST NUMBER              742-21
   BAROMETER     MM HG      742.7                                                  3-BAG       (4-BAG)
   HUMIDITY      G/KG        13.4                 CARBON DIOXIDE        G/KM       372.9      ( 372.1)
   TEMPERATURE   DEG C       25.6                 FUEL CONSUMPTION      L/100KM     19.08      ( 19.09)
                                                  HYDROCARBONS (THC)    G/KM        15.13      ( 15.30)
                                                  CARBON MONOXIDE       G/KM        16.57      ( 16.95)
                                                  OXIDES OF NITROGEN    G/KM         3.56      (  3.60)
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                                       VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE  AND 10° RETARD
                                        PROJECT 11-5830-004
TEST NO.   742-2    RUN  1
VEHICLE MODEL   70 FAIRLANE  FORD      VEHICLE NO.74
ENGINE 0.0 L(  0. CID) V-8             DATE    9/19/80                        TEST WEIGHT  1814. KG( 4000. LBS)
TRANSMISSION A3                        BAG CART NO.  1                        ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
                                       DYNO NO.      3                        GASOLINE  EM-433-F
                                       CVS NO.   2                            ODOMETER ****** KM(63627. MILES)
BAROMETER 743.46 MM HG(29.27 IN HG)
RELATIVE HUMIDITY  57. PCT             DRY BULB TEMP. 25.6 DEG C(78.0 DEG F)
BAG RESULTS                            ABS. HUMIDITY 11.8 GM/KG               NOX HUMIDITY CORRECTION FACTOR  1.04
  TEST CYCLE                              SET                      HFET

  BLOWER DIF P MM. H2O(IN. H2O)        838.2 (33.0)              812.8 (32.0)
  BLOWER INLET P MM. H2O(IN. H2O)      762.0 (30.0)              741.7 (29.2)
  BLOWER INLET TEMP. DEG. C(DEG. F)     43.3 (110.0)              43.9 (111.0)
  BLOWER REVOLUTIONS                    111635.                    61210.
  TOT FLOW STD. CU. METRES(SCF)        209.3 ( 7390.)            115.0 ( 4062.)
  HC   SAMPLE METER/RANGE/PPM           21.0/ 4/2100.             25.7/ 4/2570.
  HC   BCKGRD METER/RANGE/PPM             .1/ 4/  10.               .2/ 4/  20.
  CO   SAMPLE METER/RANGE/PPM           36.3/ 3/ 859.             34.9/ 3/ 824.
  CO   BCKGRD METER/RANGE/PPM             .2/ 3/   5.               .1/ 3/   2.
  CO2  SAMPLE METER/RANGE/PCT           91.4/ 3/ 1.71             45.5/ 2/ 2.03
  CO2  BCKGRD METER/RANGE/PCT            4.5/ 3/  .07              1.4/ 2/  .05
  NOX  SAMPLE METER/RANGE/PPM           72.3/ 3/ 217.             98.1/ 3/ 294.
  NOX  BCKGRD METER/RANGE/PPM             .3/ 3/   1.               .3/ 3/   1.
  DILUTION FACTOR                          6.70                      5.66
  HC   CONCENTRATION PPM                2091.                     2554.
  CO   CONCENTRATION PPM                 811.                      775.
  CO2  CONCENTRATION PCT                   1.65                      1.99
  NOX  CONCENTRATION PPM                 216.1                     293.6
  HC   MASS GRAMS                        252.41                    169.40
  CO   MASS GRAMS                        197.72                    103.86
  CO2  MASS GRAMS                       6317.8                    4192.9
  NOX  MASS GRAMS                         89.79                     65.38
  RUN TIME                 SECONDS      1396.                      765.
        DFC, WET (DRY)                   .851 ( .835)              .823 ( .809)
        SCF, WET (DRY)                  1.000 ( .966)             1.000 ( .964)
        VOL (SCM)                        209.3                     115.0
        SAM BLR (SCM)                      0.00                      0.00
        KM  (MEASURED)                    21.75                     16.46

  TEST NUMBER,                           742-22                    742-23
  BAROMETER,             MM HG           743.5                     743.7
  HUMIDITY,              G/KG             11.8                      11.1
  TEMPERATURE,           DEG C            25.6                      25.6
   CARBON DIOXIDE,       G/KM            290.5                     254.8
  FUEL CONSUMPTION,      L/100KM          14.58                     12.69

  HYDROCARBONS,          G/KM             11.61                     10.29
  CARBON MONOXIDE,       G/KM              9.09                      6.31
  OXIDES OF NITROGEN,    G/KM              4.13                      3.97
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TABLE D-30. TEST 742 EMISSIONS RESULTS

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                FTP   VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE AND 10° RETARD
                       PROJECT 11-5830-004

TEST NO.   742-3    RUN  1              VEHICLE NO.74                       TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD       DATE     9/22/80                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8              BAG CART NO.  1                     GASOLINE  EM-433-F
TRANSMISSION A3                         DYNO NO.      3                     ODOMETER ###### KM(69682. MILES)
                                        CVS NO.   2

BAROMETER 740.41 MM HG(29.15 IN HG)     DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
RELATIVE HUMIDITY  60. PCT              ABS. HUMIDITY 12.1 GM/KG            NOX HUMIDITY CORRECTION FACTOR  1.05
BAG RESULTS
   BAG NUMBER                                  1                 2                 3                 4
   DESCRIPTION                          COLD TRANSIENT      STABILIZED       HOT TRANSIENT      STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)        833.1 (32.8)      812.8 (32.0)      812.8 (32.0)      812.8 (32.0)
   BLOWER INLET P MM. H2O(IN. H2O)      762.0 (30.0)      749.3 (29.5)      736.6 (29.0)      749.3 (29.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)     41.1 (106.0)      42.2 (108.0)      43.3 (110.0)      42.8 (109.0)
   BLOWER REVOLUTIONS                      40345.            69477.            40360.            69415.
   TOT FLOW STD. CU. METRES(SCF)         75.6 ( 2670.)    130.2 ( 4598.)     75.6 ( 2670.)    130.0 ( 4590.)
   HC   SAMPLE METER/RANGE/PPM          22.4/ 4/2240.     12.0/ 4/1200.     18.6/ 4/1860.     12.7/ 4/1270.
   HC   BCKGRD METER/RANGE/PPM            .1/ 4/  10.       .2/ 4/  20.       .2/ 4/  20.       .2/ 4/  20.
   CO   SAMPLE METER/RANGE/PPM          66.3/ 2/3504.     69.4/11/ 291.     34.1/ 3/ 803.     89.9/12/ 221.
   CO   BCKGRD METER/RANGE/PPM            .2/ 2/   8.      1.7/11/   5.       .1/ 3/   2.      1.9/12/   4.
   CO2  SAMPLE METER/RANGE/PCT          84.2/ 3/ 1.56     61.3/ 3/ 1.09     81.0/ 3/ 1.49     61.4/ 3/ 1.09
   CO2  BCKGRD METER/RANGE/PCT           3.5/ 3/  .05      4.2/ 3/  .06      3.9/ 3/  .06      3.7/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM          37.2/ 3/ 112.     70.5/ 2/  71.     53.8/ 3/ 161.     81.7/ 2/  82.
   NOX  BCKGRD METER/RANGE/PPM            .2/ 3/   1.      1.0/ 2/   1.       .3/ 3/   1.      1.0/ 2/   1.
   DILUTION FACTOR                           6.34             10.83              7.64             10.81
   HC   CONCENTRATION PPM                   2232.             1182.             1843.             1252.
   CO   CONCENTRATION PPM                   3325.              275.              743.              207.
   CO2  CONCENTRATION PCT                   1.51              1.03              1.44              1.04
   NOX  CONCENTRATION PPM                   111.1              69.6             160.6              80.8
   HC   MASS GRAMS                          97.31             88.75             80.35             93.82
   CO   MASS GRAMS                         292.75             41.68             67.17             31.61
   CO2  MASS GRAMS                         2093.1            2456.5            1991.5            2473.3
   NOX  MASS GRAMS                          16.85             18.18             24.36             21.06

   HC   GRAMS/KM                            16.81             14.29             13.93             15.16
   CO   GRAMS/KM                            50.56              6.71             11.64              5.11
   CO2  GRAMS/KM                            361.5             395.3             345.2             399.7
   NOX  GRAMS/KM                             2.91              2.93              4.22              3.40
   FUEL CONSUMPTION BY CB L/100KM           21.10             19.26             17.40             19.45

   RUN TIME                  SECONDS         503.              867.              504.              867.
   MEASURED DISTANCE         KM              5.79              6.21              5.77              6.19
        DFC, WET (DRY)                           .884 ( .847)                        .893 ( .876)
        SCF, WET (DRY)                          1.000 ( .969)                       1.000 ( .969)
        VOL (SCM)                                      205.9                               205.4
        SAM BLR (SCM)                                   0.00                                0.00
        KM  (MEASURED)                                 12.00                               11.96
        FUEL CONSUMPTION L/100KM                       20.14                               18.44

COMPOSITE RESULTS                                                                               3-BAG       (4-BAG)
   TEST NUMBER               742-31                               CARBON DIOXIDE        G/KM     374.6     ( 375.8)
   BAROMETER      MM HG       740.4                               FUEL CONSUMPTION      L/100KM   19.13     ( 19.19)
   HUMIDITY       G/KG         12.1                               HYDROCARBONS (THC)    G/KM      14.71     ( 14.97)
   TEMPERATURE    DEG C        25.0                               CARBON MONOXIDE       G/KM      17.16     ( 16.69)
                                                                  OXIDES OF NITROGEN    G/KM       3.28     (  3.42)
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                      VEHICLE EMISSIONS RESULTS - 12 PERCENT MISFIRE  AND 10° RETARD
                       PROJECT 11-5830-004

TEST NO.   742-3    RUN  1              VEHICLE NO.74                       TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD       DATE     9/22/80                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8              BAG CART NO.  1                     GASOLINE  EM-433-F
TRANSMISSION A3                         DYNO NO.      3                     ODOMETER ###### KM(69698. MILES)
                                        CVS NO.   2

BAROMETER 740.66 MM HG(29.16 IN HG)     DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  55. PCT              ABS. HUMIDITY 10.9 GM/KG            NOX HUMIDITY CORRECTION FACTOR  1.01
BAG RESULTS
   TEST CYCLE                                SET                   FET

   BLOWER DIF P MM. H2O(IN. H2O)        817.9 (32.2)          817.9 (32.2)
   BLOWER INLET P MM. H2O(IN. H2O)      749.3 (29.5)          749.3 (29.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)     43.3 (110.0)          43.9 (111.0)
   BLOWER REVOLUTIONS                     111699.                61220.
   TOT FLOW STD. CU. METRES(SCF)        209.0 ( 7379.)        114.4 ( 4041.)
   HC   SAMPLE METER/RANGE/PPM          21.0/ 4/2100.         24.6/ 4/2460.
   HC   BCKGRD METER/RANGE/PPM            .2/ 4/  20.           .3/ 4/  30.
   CO   SAMPLE METER/RANGE/PPM          33.3/ 3/ 783.         29.6/ 3/ 691.
   CO   BCKGRD METER/RANGE/PPM            .1/ 3/   2.           .1/ 3/   2.
   CO2  SAMPLE METER/RANGE/PCT          91.8/ 3/ 1.72         44.3/ 2/ 1.97
   CO2  BCKGRD METER/RANGE/PCT           3.8/ 3/  .06          1.5/ 2/  .05
   NOX  SAMPLE METER/RANGE/PPM          74.2/ 3/ 223.         94.7/ 3/ 284.
   NOX  BCKGRD METER/RANGE/PPM            .3/ 3/   1.           .4/ 3/   1.
   DILUTION FACTOR                           6.70                  5.80
   HC   CONCENTRATION PPM                   2083.                 2435.
   CO   CONCENTRATION PPM                    741.                  651.
   CO2  CONCENTRATION PCT                    1.67                  1.92
   NOX  CONCENTRATION PPM                   221.8                 283.1
   HC   MASS GRAMS                         251.01                160.69
   CO   MASS GRAMS                         180.40                 86.80
   CO2  MASS GRAMS                         6375.9                4027.7
   NOX  MASS GRAMS                          89.19                 62.84
   RUN TIME                  SECONDS        1397.                  766.
        DFC, WET (DRY)                   .851 ( .835)          .830 ( .816)
        SCF, WET (DRY)                  1.000 ( .966)         1.000 ( .965)
        VOL (SCM)                               209.0                 114.4
        SAM BLR (SCM)                            0.00                  0.00
        KM  (MEASURED)                          21.54                 16.37

   TEST NUMBER,                             742-32                742-33
   BAROMETER,              MM HG             740.7                 740.7
   HUMIDITY,               G/KG               10.9                  11.1
   TEMPERATURE,            DEG C              24.4                  25.6
     CARBON DIOXIDE,        G/KM             296.0                 246.1
   FUEL CONSUMPTION,       L/100KM           14.77                 12.19

   HYDROCARBONS,           G/KM              11.65                  9.82
   CARBON MONOXIDE,        G/KM               8.37                  5.30
   OXIDES OF NITROGEN,     G/KM               4.14                  3.84
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TABLE D-31. TEST 743 EMISSIONS RESULTS

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                              FTP    VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                       PROJECT 11-5830-004

TEST NO.   743-1    RUN   1             VEHICLE NO.74                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD       DATE   10/ 2/80                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8              BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                         DYNO NO.      3                    ODOMETER ****** KM(65962. MILES)
                                        CVS NO.   2

BAROMETER 742.70 MM HG(29.24 IN HG)     DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  55. PCT              ABS. HUMIDITY 10.9 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.00
BAG RESULTS
   BAG NUMBER                              1                  2                  3                  4
   DESCRIPTION                       COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

   BLOWER DIF P MM. H2O(IN. H2O)     762.0 (30.0)       762.0 (30.0)       749.3 (29.5)       762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)   749.3 (29.5)       734.6 (29.0)       734.6 (29.0)       734.6 (29.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)  43.3 (110.0)       43.3 (110.0)       43.3 (110.0)       43.3 (110.0)
   BLOWER REVOLUTIONS                   40370.             67612.             40511.             69301.
   TOT FLOW STD. CU. METRES(SCF)      76.3 ( 2694.)      131.1 ( 4629.)      76.3 ( 2695.)      130.9 ( 4621.)
   HC   SAMPLE METER/RANGE/PPM       40.6/ 3/ 406.      18.7/ 3/ 187.      28.0/ 3/ 280.      18.0/ 3/ 180.
   HC   BCKGRD METER/RANGE/PPM        2.1/ 3/  21.       1.8/ 3/  18.       1.8/ 3/  18.       1.7/ 3/  17.
   CO   SAMPLE METER/RANGE/PPM       85.6/ 3/2344.      65.7/11/ 269.      88.8/11/ 431.      93.1/12/ 228.
   CO   BCKGRD METER/RANGE/PPM         .3/ 3/   7.       1.7/11/   5.       1.2/11/   3.       1.9/12/   4.
   CO2  SAMPLE METER/RANGE/PCT       80.8/ 3/ 1.49      57.6/ 3/ 1.02      77.9/ 3/ 1.47      57.6/ 3/ 1.02
   CO2  BCKGRD METER/RANGE/PCT        3.8/ 3/  .06       3.7/ 3/  .06       3.8/ 3/  .06       3.6/ 3/  .06
   NOX  SAMPLE METER/RANGE/PPM       47.0/ 3/ 141.      75.1/ 2/  75.      60.9/ 3/ 183.      80.5/ 2/  81.
   NOX  BCKGRD METER/RANGE/PPM         .7/ 3/   2.       1.4/ 2/   1.        .4/ 3/   1.       1.3/ 2/   1.
   DILUTION FACTOR                        7.65              12.64               8.72              12.70
   HC   CONCENTRATION PPM                388.               170.               272.               164.
   CO   CONCENTRATION PPM               2248.               254.               408.               217.
   CO2  CONCENTRATION PCT                1.44               .96               1.42                .96
   NOX  CONCENTRATION PPM               139.2               73.8              181.6               79.3
   HC   MASS GRAMS                      17.66              12.88              11.97              12.40
   CO   MASS GRAMS                     199.70              38.78              34.29              33.00
   CO2  MASS GRAMS                     2005.4             2311.7             1978.6             2311.3
   NOX  MASS GRAMS                      20.40              18.39              26.64              19.94

   HC   GRAMS/KM                         2.93               2.05               2.07               1.98
   CO   GRAMS/KM                        34.34               6.17               6.26               5.28
   CO2  GRAMS/KM                        344.8              367.8              341.3              369.5
   NOX  GRAMS/KM                         3.51               2.94               4.59               3.19
   FUEL CONSUMPTION BY CB L/100KM       17.42              16.39              15.27              16.39

   RUN TIME                 SECONDS      505.               867.               505.               867.
   MEASURED DISTANCE        KM           5.82               6.29               5.80               6.26
        DFC, WET (DRY)                        .902 ( .886)                          .900 ( .892)
        SCF, WET (DRY)                       1.000 ( .971)                         1.000 ( .971)
        VOL (SCM)                                  207.4                                 207.2
        SAM BLR (SCM)                               0.00                                  0.00
        KM  (MEASURED)                             12.10                                 12.05
        FUEL CONSUMPTION L/100KM                   16.88                                 15.85

COMPOSITE RESULTS                                                                      3-BAG      (4-BAG)
   TEST NUMBER           743-11                         CARBON DIOXIDE        G/KM     355.8     ( 356.3)
   BAROMETER     MM HG   742.7                          FUEL CONSUMPTION      L/100KM  16.30     ( 16.29)
   HUMIDITY      G/KG     10.9                          HYDROCARBONS (THC)    G/KM      2.24     (  2.22)
   TEMPERATURE   DEG C    24.4                          CARBON MONOXIDE       G/KM     12.02     ( 11.73)
                                                        OXIDES OF NITROGEN    G/KM      3.52     (  3.39)
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                                     VEHICLE EMISSIONS RESULTS - UNMODIFIED
                                       PROJECT 11-5830-004

TEST NO.   743-1    RUN   1             VEHICLE NO.74                      TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD       DATE   10/ 2/80                    ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8              BAG CART NO.  1                    GASOLINE  EM-433-F
TRANSMISSION A3                         DYNO NO.      3                    ODOMETER ****** KM(65973. MILES)
                                        CVS NO.   2

BAROMETER 742.95 MM HG(29.25 IN HG)     DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  55. PCT              ABS. HUMIDITY 10.9 GM/KG           NOX HUMIDITY CORRECTION FACTOR  1.00
BAG RESULTS
   TEST CYCLE                                 SET                HFET

   BLOWER DIF P MM. H2O(IN. H2O)         762.0 (30.0)        762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)       734.6 (29.0)        734.6 (29.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)      42.8 (109.0)        43.3 (110.0)
   BLOWER REVOLUTIONS                       112040.              61368.
   TOT FLOW STD. CU. METRES(SCF)         211.3 ( 7460.)      115.6 ( 4080.)
   HC   SAMPLE METER/RANGE/PPM           29.7/ 3/ 297.       38.4/ 3/ 384.
   HC   BCKGRD METER/RANGE/PPM            1.5/ 3/  15.        1.7/ 3/  17.
   CO   SAMPLE METER/RANGE/PPM           24.8/ 3/ 574.       30.4/ 3/ 711.
   CO   BCKGRD METER/RANGE/PPM             .2/ 3/   5.         .1/ 3/   2.
   CO2  SAMPLE METER/RANGE/PCT           86.7/ 3/ 1.61       43.0/ 2/ 1.90
   CO2  BCKGRD METER/RANGE/PCT            3.7/ 3/  .06        1.5/ 2/  .05
   NOX  SAMPLE METER/RANGE/PPM           78.5/ 3/ 236.       30.7/ 4/ 307.
   NOX  BCKGRD METER/RANGE/PPM             .3/ 3/   1.         .1/ 4/   1.
   DILUTION FACTOR                            7.91                6.69
   HC   CONCENTRATION PPM                    284.                370.
   CO   CONCENTRATION PPM                    542.                671.
   CO2  CONCENTRATION PCT                    1.56                1.85
   NOX  CONCENTRATION PPM                   234.7               306.1
   HC   MASS GRAMS                          34.58               24.62
   CO   MASS GRAMS                         133.43               90.27
   CO2  MASS GRAMS                         6032.4              3917.0
   NOX  MASS GRAMS                          95.27               68.53
   RUN TIME                 SECONDS         1397.                765.
        DFC, WET (DRY)                  .874 ( .858)        .851 ( .836)
        SCF, WET (DRY)                 1.000 ( .967)       1.000 ( .965)
        VOL (SCM)                            211.3               115.6
        SAM BLR (SCM)                         0.00                0.00
        KM  (MEASURED)                       21.61               16.22

   TEST NUMBER,                             743-12              743-13
   BAROMETER,               MM HG            743.0               742.7
   HUMIDITY,                G/KG              10.9                11.1
   TEMPERATURE,             DEG C             24.4                25.6
    CARBON DIOXIDE,          G/KM            279.1               241.4
   FUEL CONSUMPTION,        L/100KM          12.54               10.88

   HYDROCARBONS,            G/KM              1.60                1.52
   CARBON MONOXIDE,         G/KM              6.17                5.56
   OXIDES OF NITROGEN,      G/KM              4.41                4.22
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TABLE D-32. TEST 743 EMISSIONS RESULTS

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                         FTP   VEHICLE EMISSIONS RESULTS - LEAN IDLE
                                 PROJECT 11-5030-004

                               VEHICLE NO.74                            TEST WEIGHT  1814. KG( 4000. LBS)
TEST NO.   743-2    RUN   1    DATE   10/ 3/80                          ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
VEHICLE MODEL   70 FAIRLANE  FORD   BAG CART NO.  1                     GASOLINE  EM-433-F
ENGINE 0.0 L(  0. CID) V-8     DYNO NO.      3                          ODOMETER ****** KM(66015. MILES)
TRANSMISSION A3                CVS NO.   2

                               DRY BULB TEMP. 25.0 DEG C(77.0 DEG F)
BAROMETER 747.01 MM HG(29.41 IN HG)   ABS. HUMIDITY  7.2 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .90
RELATIVE HUMIDITY  34. PCT
BAG RESULTS                            1                 2                   3                 4
   BAG NUMBER                  COLD TRANSIENT        STABILIZED        HOT TRANSIENT       STABILIZED
   DESCRIPTION

   BLOWER DIF P MM. H2O(IN. H2O)        762.0 (30.0)      762.0 (30.0)      762.0 (30.0)      762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)      749.3 (29.5)      749.3 (29.5)      734.6 (29.0)      749.3 (29.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)     43.3 (110.0)      43.3 (110.0)      42.8 (109.0)      42.8 (109.0)
   BLOWER REVOLUTIONS                     40587.            69403.            40506.            69562.
   TOT FLOW STD. CU. METRES(SCF)         76.8 ( 2712.)    131.7 ( 4651.)     76.8 ( 2713.)    131.8 ( 4653.)
   HC  SAMPLE METER/RANGE/PPM           44.6/ 3/ 446.     26.3/ 3/ 263.     43.6/ 3/ 436.     32.9/ 3/ 329.
   HC  BCKGRD METER/RANGE/PPM            1.7/ 3/  17.      1.7/ 3/  17.      1.6/ 3/  16.      1.5/ 3/  15.
   CO  SAMPLE METER/RANGE/PPM           77.0/13/2054.     72.9/12/ 168.     81.3/11/ 372.     67.9/12/ 153.
   CO  BCKGRD METER/RANGE/PPM             .2/13/   5.      3.7/12/   9.      1.2/11/   3.      1.3/12/   2.
   CO2 SAMPLE METER/RANGE/PCT           82.6/ 3/ 1.52     57.6/ 3/ 1.03     75.6/ 3/ 1.44     56.5/ 3/  .99
   CO2 BCKGRD METER/RANGE/PCT            3.7/ 3/  .06      4.3/ 3/  .05      3.8/ 3/  .06      4.1/ 3/  .04
   NOX SAMPLE METER/RANGE/PPM           63.0/ 3/ 187.     84.8/ 2/  85.     76.5/ 3/ 230.     86.6/ 2/  87.
   NOX BCKGRD METER/RANGE/PPM             .4/ 3/   1.      1.3/ 2/   1.       .2/ 3/   1.      1.0/ 2/   1.
   DILUTION FACTOR                          7.50             12.67              8.82             12.87
   HC  CONCENTRATION PPM                    431.              247.              422.              315.
   CO  CONCENTRATION PPM                   1968.              158.              354.              146.
   CO2 CONCENTRATION PCT                    1.47               .95              1.39               .94
   NOX CONCENTRATION PPM                   186.0              83.6             229.0              85.7
   HC  MASS GRAMS                          19.99             18.79             18.69             23.75
   CO  MASS GRAMS                         175.96             24.20             31.69             22.45
   CO2 MASS GRAMS                         2073.7            2302.2            1954.1            2257.4
   NOX MASS GRAMS                          24.73             10.86             30.13             19.34

   HC  GRAMS/KM                             3.36              2.93              3.15              3.77
   CO  GRAMS/KM                            29.59              3.77              5.35              3.54
   CO2 GRAMS/KM                            348.8             358.9             329.8             355.5
   NOX GRAMS/KM                             4.16              2.94              5.09              3.04
   FUEL CONSUMPTION BY CB L/100KM          17.33             15.97             14.86             15.92

   RUN TIME            SECONDS              505.              867.              505.              867.
   MEASURED DISTANCE   KM                   5.95              6.41              5.93              6.35
         DFC, WET (DRY)                            .902 ( .891)                        .909 ( .899)
         SCF, WET (DRY)                           1.000 ( .977)                       1.000 ( .978)
         VOL (SCM)                                      208.5                               208.6
         SAM BLR (SCM)                                   0.00                                0.00
         KM  (MEASURED)                                 12.36                               12.27
         FUEL CONSUMPTION L/100KM                       16.62                               15.41

                                                                                        3-BAG        (4-BAG)
COMPOSITE RESULTS                                       CARBON DIOXIDE       G/KM       348.9       ( 347.8)
     TEST NUMBER          743-21                        FUEL CONSUMPTION     L/100KM     15.95       ( 15.93)
     BAROMETER     MM HG  747.0                         HYDROCARBONS (THC)  G/KM        3.08       (  3.33)
     HUMIDITY      G/KG     7.2                         CARBON MONOXIDE      G/KM        9.55       (  9.40)
     TEMPERATURE   DEG C   25.0                         OXIDES OF NITROGEN   G/KM        3.78       (  3.81)
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                                VEHICLE EMISSIONS RESULTS - LEAN IDLE
                                 PROJECT 11-5030-004

                               VEHICLE NO.74                            TEST WEIGHT  1814. KG( 4000. LBS)
TEST NO.   743-2    RUN   1    DATE   10/ 3/80                          ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
VEHICLE MODEL   70 FAIRLANE  FORD   BAG CART NO.  1                     GASOLINE  EM-433-F
ENGINE 0.0 L(  0. CID) V-8     DYNO NO.      3                          ODOMETER ****** KM(66032. MILES)
TRANSMISSION A3                CVS NO.   2

BAROMETER 747.27 MM HG(29.42 IN HG)   DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  38. PCT            ABS. HUMIDITY  7.4 GM/KG          NOX HUMIDITY CORRECTION FACTOR   .90
BAG RESULTS
   TEST CYCLE                             SET                    HFET

   BLOWER DIF P MM. H2O(IN. H2O)        762.0 (30.0)           762.0 (30.0)
   BLOWER INLET P MM. H2O(IN. H2O)      749.3 (29.5)           749.3 (29.5)
   BLOWER INLET TEMP. DEG. C(DEG. F)     43.3 (110.0)           43.3 (110.0)
   BLOWER REVOLUTIONS                    112054.                 62005.
   TOT FLOW STD. CU. METRES(SCF)        212.1 ( 7491.)         117.3 ( 4143.)
   HC  SAMPLE METER/RANGE/PPM           39.9/ 3/ 399.          42.1/ 3/ 421.
   HC  BCKGRD METER/RANGE/PPM            1.4/ 3/  14.           1.7/ 3/  17.
   CO  SAMPLE METER/RANGE/PPM           85.8/11/ 407.          97.0/11/ 506.
   CO  BCKGRD METER/RANGE/PPM             .7/11/   2.            .7/11/   2.
   CO2 SAMPLE METER/RANGE/PCT           85.8/ 3/ 1.59          42.3/ 2/ 1.84
   CO2 BCKGRD METER/RANGE/PCT            3.9/ 3/  .06           1.5/ 2/  .05
   NOX SAMPLE METER/RANGE/PPM           85.6/ 3/ 257.          32.9/ 4/ 329.
   NOX BCKGRD METER/RANGE/PPM             .5/ 3/   2.            .2/ 4/   2.
   DILUTION FACTOR                          8.03                   6.87
   HC  CONCENTRATION PPM                    387.                   406.
   CO  CONCENTRATION PPM                    387.                   480.
   CO2 CONCENTRATION PCT                    1.54                   1.81
   NOX CONCENTRATION PPM                   255.5                  327.3
   HC  MASS GRAMS                          47.31                  27.50
   CO  MASS GRAMS                          95.70                  65.58
   CO2 MASS GRAMS                         5973.3                 3897.1
   NOX MASS GRAMS                          93.46                  65.77
   RUN TIME                SECONDS         1397.                   773.
         DFC, WET (DRY)                 .875 ( .865)           .854 ( .845)
         SCF, WET (DRY)                1.000 ( .973)          1.000 ( .971)
         VOL (SCM)                         212.1                  117.3
         SAM BLR (SCM)                      0.00                   0.00
         KM  (MEASURED)                    22.02                  16.59

    TEST NUMBER,                          743-22                 743-23
    BAROMETER,              MM HG          747.3                  747.0
    HUMIDITY,               G/KG             7.4                    7.2
    TEMPERATURE,            DEG C           24.4                   25.0
      CARBON DIOXIDE,        G/KM          271.2                  234.9
    FUEL CONSUMPTION,       L/100KM        12.16                  10.52

    HYDROCARBONS,           G/KM            2.15                   1.66
    CARBON MONOXIDE,        G/KM            4.35                   3.95
    OXIDES OF NITROGEN,     G/KM            4.24                   3.96
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TABLE D-33. TEST 743 EMISSIONS RESULTS

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                                   FTP    VEHICLE EMISSIONS RESULTS - LEAN IDLE
                                           PROJECT 11-5830-004

TEST NO.   743-3    RUN   1               VEHICLE NO.74                        TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD         DATE   10/ 6/80                      ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8                BAG CART NO.  1                      GASOLINE  EM-433-F
TRANSMISSION A3                           DYNO NO.      3                      ODOMETER ###### KM(66078. MILES)
                                          CVS NO.   2

BAROMETER 748.79 MM HG(29.48 IN HG)       DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  59. PCT                ABS. HUMIDITY 11.5 GM/KG             NOX HUMIDITY CORRECTION FACTOR  1.03
BAG RESULTS
  BAG NUMBER                                    1                  2                  3                  4
  DESCRIPTION                            COLD TRANSIENT       STABILIZED        HOT TRANSIENT        STABILIZED

  BLOWER DIF P MM. H2O(IN. H2O)          774.7 (30.5)       762.0 (30.0)       749.3 (29.5)       762.0 (30.0)
  BLOWER INLET P MM. H2O(IN. H2O)        762.0 (30.0)       749.3 (29.5)       736.6 (29.0)       749.3 (29.5)
  BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)       43.3 (110.0)       43.3 (110.0)       43.3 (110.0)
  BLOWER REVOLUTIONS                        40586.             69502.             40537.             69549.
  TOT FLOW STD. CU. METRES(SCF)           76.9 ( 2715.)     132.0 ( 4662.)      77.1 ( 2721.)     132.0 ( 4660.)
  HC  SAMPLE METER/RANGE/PPM             45.3/ 3/ 453.      27.6/ 3/ 276.      50.6/ 3/ 506.      31.3/ 3/ 313.
  HC  BCKGRD METER/RANGE/PPM              1.5/ 3/  15.       1.6/ 3/  16.       2.0/ 3/  20.       1.7/ 3/  17.
  CO  SAMPLE METER/RANGE/PPM             76.2/ 3/2028.      70.5/12/ 161.      87.7/11/ 422.      80.6/12/ 191.
  CO  BCKGRD METER/RANGE/PPM               .1/ 3/   2.       1.7/12/   3.        .8/11/   2.        .8/12/   1.
  CO2 SAMPLE METER/RANGE/PCT             81.0/ 3/ 1.49      54.6/ 3/ 1.00      77.0/ 3/ 1.42      56.0/ 3/  .98
  CO2 BCKGRD METER/RANGE/PCT              3.5/ 3/  .05       3.7/ 3/  .06       3.7/ 3/  .06       3.2/ 3/  .05
  NOX SAMPLE METER/RANGE/PPM             49.6/ 3/ 149.      71.9/ 2/  72.      65.4/ 3/ 196.      74.6/ 2/  75.
  NOX BCKGRD METER/RANGE/PPM               .1/ 3/   0.        .7/ 2/   1.        .3/ 3/   1.       1.1/ 2/   1.
  DILUTION FACTOR                           7.75              12.80               8.84              12.96
  HC  CONCENTRATION PPM                     442.               281.               488.               297.
  CO  CONCENTRATION PPM                    1929.               152.               401.               182.
  CO2 CONCENTRATION PCT                     1.44                .94               1.37                .94
  NOX CONCENTRATION PPM                    148.5               71.3              195.4               73.6
  HC  MASS GRAMS                           19.59              21.41              21.69              22.62
  CO  MASS GRAMS                          172.67              23.31              35.93              28.01
  CO2 MASS GRAMS                          2032.0             2280.4             1938.2             2260.0
  NOX MASS GRAMS                           22.39              18.45              29.53              19.04

  HC  GRAMS/KM                              3.35               3.38               3.72               3.59
  CO  GRAMS/KM                             29.50               3.68               6.15               4.44
  CO2 GRAMS/KM                             347.2              359.9              331.9              359.3
  NOX GRAMS/KM                              3.83               2.91               5.06               3.02
  FUEL CONSUMPTION BY CB L/100KM           17.25              16.06              15.08              16.13

  RUN TIME              SECONDS             505.               867.               506.               868.
  MEASURED DISTANCE     KM                  5.85               6.34               5.84               6.31
      DFC, WET (DRY)                             .903 ( .886)                          .910 ( .892)
      SCF, WET (DRY)                            1.000 ( .970)                         1.000 ( .970)
      VOL (SCM)                                        208.9                                 209.0
      SAM BLR (SCM)                                     0.00                                  0.00
      KM  (MEASURED)                                   12.19                                 12.15
      FUEL CONSUMPTION L/100KM                         16.63                                 15.63

COMPOSITE RESULTS                                                                        3-BAG      (4-BAG)
   TEST NUMBER           743-31                          CARBON DIOXIDE       G/KM       349.6      ( 349.5)
   BAROMETER     MM HG   748.8                           FUEL CONSUMPTION     L/100KM    16.04      ( 16.06)
   HUMIDITY      G/KG     11.5                           HYDROCARBONS (THC)   G/KM        3.46      (  3.53)
   TEMPERATURE   DEG C    24.4                           CARBON MONOXIDE      G/KM        9.69      (  9.91)
                                                         OXIDES OF NITROGEN   G/KM        3.69      (  3.72)
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                                          VEHICLE EMISSIONS RESULTS - LEAN IDLE
                                           PROJECT 11-5830-004

TEST NO.   743-3    RUN   1               VEHICLE NO.74                        TEST WEIGHT  1814. KG( 4000. LBS)
VEHICLE MODEL   70 FAIRLANE  FORD         DATE   10/ 6/80                      ACTUAL ROAD LOAD   8.9 KW( 12.0 HP)
ENGINE 0.0 L(  0. CID) V-8                BAG CART NO.  1                      GASOLINE  EM-433-F
TRANSMISSION A3                           DYNO NO.      3                      ODOMETER ###### KM(66091. MILES)
                                          CVS NO.   2

BAROMETER 748.54 MM HG(29.47 IN HG)       DRY BULB TEMP. 24.4 DEG C(76.0 DEG F)
RELATIVE HUMIDITY  52. PCT                ABS. HUMIDITY 10.0 GM/KG             NOX HUMIDITY CORRECTION FACTOR   .98
BAG RESULTS
  TEST CYCLE                                   SET                    HFET

   BLOWER DIF P MM. H2O(IN. H2O)          774.7 (30.5)           787.4 (31.0)
   BLOWER INLET P MM. H2O(IN. H2O)        762.0 (30.0)           762.0 (30.0)
   BLOWER INLET TEMP. DEG. C(DEG. F)       43.3 (110.0)           43.3 (110.0)
   BLOWER REVOLUTIONS                        111919.                 61412.
   TOT FLOW STD. CU. METRES(SCF)          211.9 ( 7482.)         116.2 ( 4102.)
   HC  SAMPLE METER/RANGE/PPM             41.2/ 3/ 412.          46.1/ 3/ 461.
   HC  BCKGRD METER/RANGE/PPM              1.6/ 3/  16.           2.0/ 3/  20.
   CO  SAMPLE METER/RANGE/PPM             94.7/11/ 484.          26.8/ 3/ 623.
   CO  BCKGRD METER/RANGE/PPM               .6/11/   2.            .1/ 3/   2.
   CO2 SAMPLE METER/RANGE/PCT             89.6/ 3/ 1.67          45.1/ 2/ 2.01
   CO2 BCKGRD METER/RANGE/PCT              3.1/ 3/  .05           1.8/ 2/  .07
   NOX SAMPLE METER/RANGE/PPM             95.9/ 3/ 288.          36.8/ 4/ 368.
   NOX BCKGRD METER/RANGE/PPM               .3/ 3/   1.            .1/ 4/   1.
   DILUTION FACTOR                            7.63                   6.33
   HC  CONCENTRATION PPM                      398.                   444.
   CO  CONCENTRATION PPM                      459.                   588.
   CO2 CONCENTRATION PCT                      1.63                   1.96
   NOX CONCENTRATION PPM                     286.9                  367.2
   HC  MASS GRAMS                            48.64                  27.75
   CO  MASS GRAMS                           113.14                  79.47
   CO2 MASS GRAMS                           6318.0                 4159.8
   NOX MASS GRAMS                           113.76                  78.62
   RUN TIME              SECONDS             1397.                   766.
       DFC, WET (DRY)                     .869 ( .854)           .842 ( .830)
       SCF, WET (DRY)                    1.000 ( .960)          1.000 ( .966)
       VOL (SCM)                             211.9                  116.2
       SAM BLR (SCM)                          0.00                   0.00
       KM  (MEASURED)                        21.99                  16.70

   TEST NUMBER,                              743-32                 743-33
   BAROMETER,             MM HG              748.5                  748.3
   HUMIDITY,              G/KG                10.0                    9.6
   TEMPERATURE,           DEG C               24.4                   25.6
    CARBON DIOXIDE,        G/KM              287.3                  249.1
   FUEL CONSUMPTION,      L/100KM            12.91                  11.19

   HYDROCARBONS,          G/KM                2.21                   1.78
   CARBON MONOXIDE,       G/KM                5.14                   4.76
   OXIDES OF NITROGEN,    G/KM                5.17                   4.71
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APPENDIX E

I/M SHORT-TEST RESULTS

TABLE E-1. CAR 71 I/M SHORT-TEST RESULTS

	Rich Best Idle			12% Misfire		
	Unmod.	With Malf.		Unmod.	With Malf.	
	711-1	711-2	711-3	712-1	712-2	712-3
HC Emissions, ppm Hexane						
50 mph[a] - 1800 rpm	184	184	172	149	1416	1547
Idle - Neutral	137	219	207	126	1244	1416
2500 rpm	114	137	149	103	1117	1287
Idle - Neutral	137	219	195	114	1244	1416
Idle	137	231	219	114	1117	1201
30 mph[a] - 1100 rpm	160	207	207	160	1416	1635
Idle - Neutral	137	219	207	137	1244	1416
CO Emissions, Percent						
50 mph[a]	0.62	0.79	0.79	0.32	0.26	0.36
Idle - Neutral	0.11	4.78	4.78	0.08	0.10	0.12
2500 rpm	0.34	0.37	0.43	0.17	0.37	0.42
Idle - Neutral	0.14	5.45	5.29	0.07	0.10	0.15
Idle	0.10	4.71	4.57	0.08	0.08	0.09
30 mph[a]	0.37	0.74	0.84	0.31	0.48	0.54
Idle - Neutral	0.14	5.21	5.06	0.09	0.10	0.13
Propane Enrichment, rpm[b,c]						
A. PCV in Place	660	680	680	690	690	660
B. PCV with Propane	770	680	680	800	820	760
C. PCV Malf.	660	690	690	660	680	650
D. PCV Malf. with Prop.	790	690	690	800	820	760
E. PCV Malf.	670	670	680	680	700	660
F. PCV Malf. with Prop.	780	670	680	790	800	750
G. PCV in Place	580	580	570	580	580	580
H. PCV with Propane	640	580	570	640	630	640
I. PCV Malf.	580	590	580	580	550	580
J. PCV Malf. with Prop.	650	590	580	650	630	640
K. PCV Malf.	590	580	570	580	560	570
L. PCV Malf. with Prop.	640	580	570	640	630	630

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[a] Car operated in Drive. [b] A. through F. in Neutral and G. through L. in Drive.

[c] System Descriptions: C, D & I, J--PCV valve removed from grommet. E, F & K, L---PCV fresh air line removed.

TABLE E-2. CAR 72 I/M SHORT TEST RESULTS
1970 DODGE CHALLENGER

	Rich Idle			12% Misfire			Lean Idle		
	Unmod.	With Malf.		Unmod.	With Malf.		Unmod.	With Malf.	
	721-1	721-2	721-3	722-1	722-2	722-3	723-1	723-2	723-3
HC Emissions, ppm Hexane									
50 mph[a] - 2000 rpm	219	207	278	184	1414	1503	231	266	305
Idle - Neutral	266	445	433	195	1812	1547	278	2219	2219
2500 rpm	195	254	254	160	1547	1460	207	344	501
Idle - Neutral	231	409	409	195	1946	1503	266	1992	1679
Idle - Clutch In	231	409	409	184	1635	1591	254	2082	1812
30 mph[a] - 1200 rpm	266	337	337	231	1723	1635	254	383	422
Idle - Neutral	242	421	421	207	1901	1635	278	1723	1547
CO Emissions, Percent									
50 mpg[a]	0.23	0.19	0.23	0.24	0.29	0.24	0.22	0.76	0.85
Idle - Neutral	0.37	7.13	7.24	0.36	0.46	0.31	0.31	0.18	0.19
2500 rpm	0.18	0.23	0.23	0.20	0.28	0.21	0.17	0.21	0.37
Idle - Neutral	0.40	7.02	7.02	0.48	0.51	0.44	0.25	0.20	0.21
Idle - Clutch In	0.47	7.02	7.24	0.54	0.55	0.46	0.29	0.19	0.20
30 mph[a]	0.10	0.39	0.56	0.10	0.26	0.12	0.10	0.10	0.11
Idle - Neutral	0.42	7.47	7.35	0.55	0.69	0.42	0.31	0.19	0.20
Propane Enrichment, rpm[b,c]									
A. PCV in Place	760	740	750	750	740	760	750	750	760
B. PCV with Propane	890	740	750	840	850	850	850	1700	1700
C. PCV Malf.	750	760	770	740	730	740	730	607	680
D. PCV Malf. with Prop.	890	760	770	870	850	870	870	1750	1750
E. PCV Malf.	770	730	740	760	740	760	710	760	750
F. PCV Malf. with Prop.	880	730	740	840	830	840	810	1700	1650

[a] Car operated in 3rd gear [b] A. through F. in Neutral

[c] System Descriptions: C, D -- PCV valve removed from grommet. E, F -- PCV fresh air line removed.

TABLE E-3. CAR 73 I/M SHORT-TEST RESULTS
1970 CHEVROLET MONTE CARLO

	Rich Best Idle			12% Misfire w/o Vac.Adv.				Rich Idle
	Unmod.	With Malf.		W/O Adv.	With Malf.		Unmod.	w/o Vac. Adv.
	731-1	731-3	731-4	732-1	732-2	732-3	733-1	731-2
HC Emissions, ppm Hexane								
50 mph[a] - 1900 rpm	195	219	254	219	--	1460	231	137
Idle - Neutral	114	254	290	242	--	1460	172	278
2500 rpm	103	137	149	207	1287	1330	137	126
Idle - Neutral	126	266	278	242	1416	1330	160	266
Idle	149	325	373	254	1460	1416	195	337
30 mph[a] - 1150 rpm	195	302	349	207	1460	1330	231	172
Idle - Neutral	160	278	302	242	1547	1591	195	290
CO Emissions, Percent								
50 mph[a] - 1900 rpm	0.66	0.84	0.84	0.37	--	0.39	0.58	0.61
Idle - Neutral	0.11	5.53	6.81	0.11	--	0.11	0.11	6.13
2500 rpm	0.54	0.74	0.67	0.60	0.49	0.54	0.44	0.54
Idle - Neutral	0.11	5.53	6.61	0.12	0.11	0.11	0.11	5.86
Idle	0.08	5.61	6.71	0.08	0.08	0.08	0.09	5.95
30 mph[a] - 1150 rpm	0.12	0.43	0.86	0.12	0.14	0.13	0.13	0.27
Idle - Neutral	0.11	5.69	6.22	0.11	0.11	0.12	0.10	5.86
Propane Enrichment, rpm[b,c]								
A. PCV in Place	900	800	830	830	720	730	800	790
B. PCV with Propane	1010	800	830	1020	860	920	1030	790
C. PCV Malf.	900	780	850	800	710	710	800	810
D. PCV Malf. with Prop.	1030	780	850	1060	850	920	1040	810
E. PCV Malf.	910	790	830	820	720	730	810	780
F. PCV Malf. with Prop.	990	790	820	1020	850	910	970	780
G. PCV in Place	600	600	600	610	580	580	600	600
H. PCV with Propane	670	600	600	670	630	640	660	600
I. PCV Malf.	590	620	620	600	570	570	590	610
J. PCV Malf. with Prop.	680	620	620	680	630	650	670	610
K. PCV Malf.	610	600	600	610	580	580	610	590
L. PCV Malf. with Prop.	670	600	600	670	630	640	660	590

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[a] Car operated in Drive. [b] A. through F. in Neutral and G. through L. in Drive.

[c] System Descriptions: C, D & I, J--PCV valve removed from grommet. E, F & K, L--PCV fresh air line removed.

TABLE E-4. CAR 74 I/M SHORT TEST RESULTS
1970 Ford Fairlane

	Rich Idle			12% Misfire & 10° Retard			Lean Idle		
	Unmod.	With Malf.		Unmod.	With Malf.		Unmod.	With Malf.	
	741-1	741-2	741-3	744-1	742-2	742-3	743-1	743-2	743-3
HC Emissions, ppm Hexane									
50 mph[a] - 2000 rpm	188	198	184	266	1503	1547	195	219	242
Idle - Neutral	382	332	445	302	1287	1503	313	1845	2209
2500 rpm	105	81	219	172	1244	1416	126	278	302
Idle - Neutral	267	342	506	207	1330	1460	242	1469	1911
Idle	218	425	591	278	1373	1416	207	963	1063
30 mph[a] -1380 rpm	183	226	579	278	1503	1547	219	313	313
Idle - Neutral	213	337	714	207	1503	1373	207	1885	1316
CO Emissions, Percent									
50 mph[a]	0.40	0.50	0.52	0.26	0.35	0.37	0.48	0.37	0.36
Idle - Neutral	0.15	8.75	9.66	0.13	0.12	0.15	0.14	0.16	0.16
2500 rpm	0.32	0.31	0.39	0.16	0.27	0.29	0.27	0.34	0.22
Idle - Neutral	0.13	8.75	9.04	0.21	0.12	0.14	0.18	0.18	0.17
Idle	0.10	8.75	9.19	0.14	0.09	0.12	0.10	0.13	0.14
30 mph[a]	0.14	0.31	0.50	0.15	0.13	0.15	0.14	0.14	0.13
Idle - Neutral	0.18	8.89	9.34	0.14	0.12	0.14	0.16	0.16	0.17
Propane Enrichment, rpm[b,c]									
A. PCV in Place	750	790	760	750	720	730	770	750	760
B. PCV with Propane	920	800	750	850	880	880	900	1300	1350
C. PCV Malf.	720	850	830	730	720	710	740	720	700
D. PCV Malf. with Prop.	940	850	830	870	890	890	900	1400	1400
E. PCV Malf.	750	770	730	750	720	730	760	710	700
F. PCV Malf. with Prop.	910	780	730	850	880	880	880	1400	1400
G. PCV in Place	620	610	600	610	590	600	600	630	630
H. PCV with Propane	680	610	600	640	670	670	650	840	850
I. PCV Malf.	590	650	640	600	580	580	580	580	610
J. PCV Malf. with Prop.	680	650	630	650	670	680	660	850	860
K. PCV Malf.	610	600	590	610	580	610	610	630	650
L. PCV Malf. with Prop.	670	610	590	640	660	670	650	840	850

[a] Car operated in Drive. [b] A. through F. in Neutral and G. through L. in Drive.
[c] System Descriptions: C, D & I, J--PCV valve removed from grommet. E, F & K, L--PCV fresh air line removed.

APPENDIX F

AVERAGE VALUES FOR ALL CONFIGURATIONS

TABLE F-1. CAR 71 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

		Average Emission Rate, mg/km (Except as Noted)			
		Unmod.	Rich Idle	12% Misfire	Unscheduled[b]
Test No.	PVM	71	711	712	712-3
Barometer,	mm Hg	748.8	745.0	753.6	748.5
Humidity,	g/kg	7.5	6.8	4.6	5.3
Temperature,	°C	23.9	25.9	25.3	25.0
Total Fuel Sulfur,	mg/km	33.70	33.80	34.88	38.45
Avg. Exh. Oxygen,	%	1.34	0.50	4.30	6.98
Carbon Dioxide,	g/km	452.8	417.3	428.9	414.3
Fuel Cons.,	ℓ/100 km	20.70	20.76	21.43	23.62
Regulated Emissions					
Hydrocarbons (THC),	g/km	1.43	1.95	15.22	34.52
Carbon Monoxide,	g/km	17.59	40.01	15.80	18.83
Oxides of Nitrogen,	g/km	2.23	2.18	2.75	2.97
Particulates					
Total Particulates		100.71	88.62	123.86	110.77
Sulfate		0.68	0.63	0.51	0.97
Compound Group Totals					
Aldehydes & Ketones		37.3	44.5	254.5	295.6
Individual Hydrocarbons		698.8	970.1	3143.6	7292.3
Organic Sulfides		0.08	0.03	0.04	0.04
Organic Amines		0.08	0.18	0.40	0.34
Other Compounds					
Ammonia		3.82	2.98	1.88	4.78
Cyanide & Cyanogen		3.45	5.57	1.17	1.53
Hydrogen Sulfide		0.08	0.05	0.00	0.23
Tetramethyllead		0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00
Tetraethyllead		--	--	--	--
Ethylene Dibromide		0.00	0.00	3.68	10.45
Aldehydes & Ketones					
Formaldehyde		31.87	31.20	206.24	205.25
Acetaldehyde		4.46	6.11	33.49	17.88
Acetone		0.71	6.80	8.48	4.69
Isobutyraldehyde		--	--	--	--
Methyl Ethyl Ketone		0.27	0.36	3.71	2.29
Hexanaldehyde		0.00	0.00	2.54	65.49

TABLE F-1 (Cont'd). CAR 71 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire	Unscheduled[b]
Individual Hydrocarbons				
Methane	83.02	161.94	98.79	121.41
Ethylene	158.55	223.56	355.12	440.46
Ethane	14.20	20.53	31.52	40.90
Acetylene	101.75	175.99	113.79	124.22
Propane	1.43	8.17	2.86	3.88
Propylene	65.50	85.28	234.61	305.06
Benzene	51.82	81.06	197.82	371.95
Toluene	222.54	213.53	2109.12	5884.43
Organic Sulfides				
Carbonyl Sulfide	0.05	0.02	0.02	0.01
Methyl Sulfide	0.03	0.01	0.02	0.03
Ethyl Sulfide	0.01	0.01	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.08	0.05	0.37	0.34
Monoethylamine	0.00	0.12	0.04	0.00
Trimethylamine	0.00	0.02	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	19.67	17.12	33.10	48.55
Bromine	12.68	9.87	15.64	18.49
Phosphorus	0.09	0.06	0.11	0.12
Silicon	0.01	0.02	0.02	0.03
Cadmium	0.01	0.01	0.02	0.03
Aluminum	0.07	0.02	0.12	0.14
Sulfur	0.18	0.04	0.57	0.97
Sodium	0.06	0.04	0.09	0.13
Magnesium	0.02	0.01	0.03	0.03
Chlorine	7.58	6.44	5.73	7.63
Zinc	0.03	0.01	0.05	0.07
Copper	0.01	0.01	0.01	0.03
Nickel				
Iron	2.20	0.22	4.51	9.88
Vanadium	0.01	0.01		
Calcium	0.05	0.05	0.06	0.05

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

[b] Single test values of 12% misfire plus some unidentified malfunction.

TABLE F-2. CAR 71 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

		Average Emission Rate, mg/km (Except as Noted)			
		Unmod.	Rich Idle	12% Misfire	Unscheduled[b]
Test No.	PVM	71	711	712	712-3
Barometer,	mm Hg	748.3	744.5	754.3	748.5
Humidity,	g/kg	7.2	6.3	4.40	5.7
Temperature,	°C	24.5	26.4	26.4	25.6
Total Fuel Sulfur,	mg/km	23.18	23.39	24.36	27.58
Avg. Exh. Oxygen,	%	1.44	0.63	4.18	6.84
Carbon Dioxide,	g/km	321.55	310.9	308.9	306.6
Fuel Cons.,	ℓ/100 km	14.24	14.37	14.96	16.94
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.91	1.06	10.47	24.89
Carbon Monoxide,	g/km	5.86	14.27	5.34	7.12
Oxides of Nitrogen,	g/km	2.98	2.97	3.58	3.54
Particulates					
Total Particulates		68.08	61.60	70.20	70.20
Sulfate		0.43	0.42	0.57	1.06
Compound Group Totals					
Aldehydes & Ketones		32.2	30.3	166.3	315.5
Individual Hydrocarbons		443.7	575.9	2421.4	5643.2
Organic Sulfides		0.03	0.00	0.00	0.01
Organic Amines		0.10	0.07	0.35	0.17
Other Compounds					
Ammonia		2.33	4.78	1.77	3.90
Cyanide & Cyanogen		1.80	1.95	0.27	0.44
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00
Tetraethyllead		--	--	--	--
Ethylene Dibromide		0.00	0.00	2.50	5.76
Aldehydes & Ketones					
Formaldehyde		26.77	26.56	135.42	235.95
Acetaldehyde		4.88	3.50	20.28	43.05
Acetone		0.35	0.00	6.21	20.54
Isobutyraldehyde		--	--	--	--
Methyl Ethyl Ketone		0.14	0.20	2.20	8.56
Hexanaldehyde		0.00	0.00	2.21	7.41

TABLE F-2 (Cont'd). CAR 71 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire	Unscheduled[b]
Individual Hydrocarbons				
Methane	37.86	75.05	52.94	66.92
Ethylene	128.62	160.22	309.31	415.96
Ethane	11.50	15.13	25.03	35.73
Acetylene	57.19	95.66	69.20	72.04
Propane	1.14	5.06	1.87	2.50
Propylene	52.50	61.68	213.93	308.83
Benzene	38.62	51.80	174.63	422.98
Toluene	116.24	111.33	1574.52	4318.26
Organic Sulfides				
Carbonyl Sulfide	0.01	0.00	0.00	0.01
Methyl Sulfide	0.02	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.07	0.04	0.35	0.17
Monoethylamine	0.02	0.03	0.00	0.00
Trimethylamine	0.02	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	19.36	17.33	25.02	28.52
Bromine	17.41	13.79	14.78	11.60
Phosphorus	0.08	0.06	0.10	0.09
Silicon				
Cadmium	0.02	0.01	0.02	0.02
Aluminum	0.14	0.05	0.08	0.06
Sulfur	0.07	0.03	0.33	0.60
Sodium	0.08	0.06	0.07	0.06
Magnesium	0.02	0.01	0.02	0.02
Chlorine	6.01	4.39	4.25	4.67
Zinc	0.03		0.02	0.04
Copper	0.03			0.03
Nickel				
Iron	0.58	0.13	0.89	5.68
Vanadium		0.02		
Calcium	0.03		0.03	0.03

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km

[b] Single test values of 12% misfire plus some unidentified malfunction.

TABLE F-3. CAR 71 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

		Average Emission Rate, mg/km (Except as Noted)			
		Unmod.	Rich Idle	12% Misfire	Unscheduled[b]
Test No.	PVM	71	711	712	712-3
Barometer,	mm Hg	747.9	744.2	753.6	747.8
Humidity	g/kg	7.1	8.9	4.4	5.8
Temperature,	°C	25.6	27.8	25.6	26.7
Total Fuel Sulfur,	mg/km	20.35	20.19	21.84	24.49
Avg. Exh. Oxygen,	%	1.11	0.73	3.65	6.03
Carbon Dioxide,	g/km	281.5	275.0	277.2	273.1
Fuel Cons.,	ℓ/100km	12.50	12.40	13.41	15.04
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.95	0.94	9.46	22.49
Carbon Monoxide,	g/km	5.36	7.93	4.39	5.00
Oxides of Nitrogen,	g/km	3.18	3.43	3.81	4.06
Particulates					
Total Particulates		69.03	53.73	72.72	64.64
Sulfate		0.39	0.17	0.46	0.99
Compound Group Totals					
Aldehydes & Ketones		27.0	32.6	139.5	258.4
Individual Hydrocarbons		371.7	497.2	2032.1	5156.4
Organic Sulfides		0.02	0.00	0.01	0.01
Organic Amines		0.10	0.05	0.15	0.15
Other Compounds					
Ammonia		5.42	3.23	2.53	9.05
Cyanide & Cyanogen		6.69	8.13	0.84	1.60
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00
Tetraethyllead		--	--	--	--
Ethylene Dibromide		0.00	0.00	2.49	5.84
Aldehydes & Ketones					
Formaldehyde		22.83	28.49	122.47	210.25
Acetaldehyde		3.98	4.06	13.47	29.31
Acetone		0.15	0.00	2.73	9.88
Isobutyraldehyde		--	--	--	--
Methyl Ethyl Ketone		0.00	0.08	0.89	4.71
Hexanaldehyde		0.00	0.00	0.00	4.20

TABLE F-3 (Cont'd). CAR 71 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire	Unscheduled[b]
Individual Hydrocarbons				
Methane	31.16	55.53	49.78	57.26
Ethylene	101.52	146.62	286.70	367.72
Ethane	9.92	14.58	24.31	31.72
Acetylene	48.97	79.36	71.94	69.66
Propane	0.68	2.68	1.76	2.09
Propylene	41.99	59.49	197.04	273.59
Benzene	30.58	41.21	105.28	270.07
Toluene	106.85	97.71	1295.23	4084.26
Organic Sulfides				
Carbonyl Sulfide	0.01	0.00	0.01	0.01
Methyl Sulfide	0.02	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.09	0.01	0.14	0.15
Monoethylamine	0.01	0.05	0.01	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	14.59	16.33	21.19	24.25
Bromine	13.04	12.80	12.04	9.60
Phosphorus	0.06	0.07	0.09	0.07
Silicon				
Cadmium	0.01	0.02	0.02	0.01
Aluminum	0.05	0.04	0.02	
Sulfur	0.03	0.02	0.25	0.39
Sodium	0.06	0.06	0.06	0.05
Magnesium	0.01	0.01	0.02	0.01
Chlorine	4.68	4.29	3.89	4.52
Zinc	0.12			
Copper				
Nickel				
Iron		0.02	0.22	0.86
Vanadium		0.01	0.01	
Calcium			0.04	

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

[b] Single test values of 12% misfire plus some unidentified malfunction.

TABLE F-4. CAR 72 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

		Average Emission Rate, mg/km (Except as Noted)			
		Unmod.	Rich Idle	12% Misfire	Lean Idle
Test No.	PVM	72	721	722	723
Barometer,	mm Hg	745.3	748.7	742.2	742.5
Humidity	g/kg	10.3	6.8	10.2	9.1
Temperature,	°C	25.20	27.0	24.4	27.0
Total Fuel Sulfur,	mg/km	20.32	20.95	21.50	20.46
Avg. Exh. Oxygen,	%	1.25	1.44	3.96	6.13
Carbon Dioxide,	g/km	256.6	237.3	244.0	258.6
Fuel Cons.,	ℓ/100 km	12.48	12.87	13.21	12.57
Regulated Emissions					
Hydrocarbons (THC),	g/km	1.71	2.34	9.64	3.32
Carbon Monoxide,	g/km	19.31	36.14	22.13	16.18
Oxides of Nitrogen,	g/km	1.91	1.81	2.07	1.80
Particulates					
Total Particulates		81.74	93.71	86.36	79.34
Sulfate		0.47	1.06	0.18	0.51
Compound Group Totals					
Aldehydes & Ketones		12.8	11.1	51.7	43.2
Individual Hydrocarbons		718.8	1078.5	1946.6	889.2
Organic Sulfides		0.01	0.00	0.02	0.04
Organic Amines		0.03	0.07	0.01	0.09
Other Compounds					
Ammonia		2.90	4.38	3.75	3.65
Cyanide & Cyanogen		5.20	9.92	2.76	4.90
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00
Tetraethyllead		0.00	0.00	0.00	0.00
Ethylene Dibromide		0.00	0.00	2.06	0.00
Aldehydes & Ketones					
Formaldehyde		9.31	9.36	46.90	35.51
Acetaldehyde		3.45	1.52	4.51	7.56
Acetone		0.00	0.19	0.31	0.00
Isobutyraldehyde		--	--	--	--
Methyl Ethyl Ketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	0.00	0.06

TABLE F-4 (Cont'd). CAR 72 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

	Average Emission Rate, mg/km (Except as Noted			
	Unmod.	Rich Idle	12% Misfire	Lean Idle
Individual Hydrocarbons				
Methane	98.72	193.31	115.11	72.62
Ethylene	165.7	249.00	192.90	193.13
Ethane	15.12	22.92	19.46	17.93
Acetylene	133.11	188.74	137.80	67.08
Propane	1.92	2.27	2.50	1.95
Propylene	69.66	94.33	108.40	97.78
Benzene	54.09	83.31	122.18	55.40
Toluene	180.50	244.65	1248.28	383.29
Organic Sulfides				
Carbonyl Sulfide	0.01	0.00	0.02	0.03
Methyl Sulfide	0.00	0.00	0.00	0.01
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.02	0.01	0.01	0.08
Monoethylamine	0.01	0.05	0.01	0.01
Trimethylamine	0.01	0.01	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	15.00	10.34	15.68	14.30
Bromine	6.59	4.50	6.24	6.68
Phosphorus	0.12	0.10	0.08	0.08
Silicon				
Cadmium	0.01		0.01	0.01
Aluminum	0.03		0.03	
Sulfur	0.20	0.13	0.24	0.12
Sodium	0.06	0.02	0.06	0.04
Magnesium	0.01	0.01	0.01	0.01
Chlorine	4.44	2.30	3.88	2.96
Zinc	0.17	0.44	0.22	0.07
Copper	0.01			
Nickel				
Iron	4.75	0.73	3.26	0.37
Vanadium		0.01		
Calcium	0.07		0.05	0.04
Cobalt	0.01			

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

TABLE F-5. CAR 72 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATION - SET

		Average Emission Rate, mg/km (Except as Noted)			
		Unmod.	Rich Idle	12% Misfire	Lean Idle
Test No.	PVM	72	721	722	723
Barometer,	mm Hg	745.3	747.7	741.6	741.5
Humidity,	g/kg	9.3	6.8	10.2	9.2
Temperature,	°C	25.2	25.6	25.6	26.2
Total Fuel Sulfur,	mg/km	15.11	15.65	16.30	15.40
Avg. Exh. Oxygen,	%	1.38	1.04	3.83	5.32
Carbon Dioxide,	g/km	205.6	202.4	199.5	208.3
Fuel Cons.,	ℓ/100 km	9.28	9.61	10.01	9.46
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.87	1.24	7.22	1.49
Carbon Monoxide,	g/km	5.79	12.09	7.74	5.48
Oxides of Nitrogen,	g/km	2.55	2.60	2.68	2.49
Particulates					
Total Particulates		51.08	50.34	73.88	46.76
Sulfate		0.28	0.53	0.36	0.51
Compound Group Totals					
Aldehydes & Ketones		11.6	16.4	72.8*	25.9
Individual Hydrocarbons		364.2	570.1	1359.3	451.3
Organic Sulfides		0.03	0.01	0.00	0.01
Organic Amines		0.04	0.05	0.01	0.02
Other Compounds					
Ammonia		1.67	5.48	2.11	1.34
Cyanide & Gyanogen		3.00	5.33	0.41	3.33
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00
Tetraethyllead		0.00	0.00	0.00	0.00
Ethylene Dibromide		0.00	0.00	1.78	0.00
Aldehydes & Ketones					
Formaldehyde		9.95	13.50	64.51*	22.17
Acetaldehyde		1.61	2.85	7.95*	3.72
Acetone		0.04	0.00	0.00*	0.00
Isobutyraldehyde		--	--	--	--
Methyl Ethyl Ketone		0.00	0.00	0.00*	0.00
Hexanaldehyde		0.00	0.00	0.00*	0.00

*Values are from a single run.

TABLE F-5 (Cont'd). CAR 72 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATION - SET

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire	Lean Idle
Individual Hydrocarbons				
Methane	36.48	80.77	52.62	31.10
Ethylene	103.24	149.58	173.30	115.59
Ethane	9.57	14.66	15.86	10.40
Acetylene	59.31	96.27	70.53	37.19
Propane	0.54	1.22	1.62	0.47
Propylene	43.03	57.77	114.11	55.74
Benzene	28.03	47.08	69.21	26.77
Toluene	83.97	122.68	862.01	174.03
Organic Sulfides				
Carbonyl Sulfide	0.03	0.01	0.00	0.01
Methyl Sulfide	0.00	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.03	0.01	0.01	0.02
Monoethylamine	0.01	0.04	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	11.46	9.51	12.30	11.36
Bromine	7.05	5.91	5.67	7.10
Phosphorus	0.07	0.06	0.06	0.07
Silicon				
Cadmium	0.01	0.01		0.01
Aluminum	0.02	0.01	0.02	
Sulfur	0.06	0.04	0.21	0.06
Sodium	0.04	0.03	0.04	0.04
Magnesium	0.01	0.01	0.01	0.01
Chlorine	5.71	5.78		4.29
Zinc	0.07	0.05	0.14	0.05
Copper				
Nickel				
Iron	1.22	0.44	2.84	0.23
Vanadium				
Calcium	0.02	0.03	0.03	0.02

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

TABLE F-6. CAR 72 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

		Average Emission Rate, mg/km (Except as Noted)			
		Unmod.	Rich Idle	12% Misfire	Lean Idle
Test No.	PVM	72	721	722	723
Barometer,	mm Hg	745.2	746.8	741.4	740.8
Humidity,	g/kg	9.0	6.1	9.6	8.6
Temperature,	°C	25.9	25.6	25.0	25.9
Total Fuel Sulfur,	mg/km	13.90	14.27	15.40	14.05
Avg. Exh. Oxygen,		1.62	1.39	3.76	3.42
Carbon Dioxide,		192.6	196.3	193.7	192.1
Fuel Cons.,		8.54	8.77	9.46	8.63
Regulated Emissions					
Hydrocarbons (THC),	g/km	0.68	0.75	6.74	0.94
Carbon Monoxide,	g/km	3.33	4.27	4.17	4.46
Oxides of Nitrogen,	g/km	2.74	2.76	3.10	2.62
Particulates					
Total Particulates		49.31	45.36	51.89	70.42
Sulfate		0.25	0.58	0.39	0.60
Compound Group Totals					
Aldehydes & Ketones		9.0	10.0	93.85	13.2
Individual Hydrocarbons		243.0	341.7	1255.7	335.4
Organic Sulfides		0.00	0.00	0.00	0.02
Organic Amines		0.03	0.01	0.02	0.02
Other Compounds					
Ammonia		1.69	2.90	1.74	3.23
Cyanide & Cyanogen		6.97	8.63	1.23	8.49
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00
Tetraethyllead		0.00	0.00	0.00	0.00
Ethylene Dibromide		0.00	0.00	1.77	0.00
Aldehydes & Ketones					
Formaldehyde		7.13	9.74	79.71	11.37
Acetaldehyde		1.72	0.23	11.38	1.75
Acetone		0.09	0.00	1.63	0.00
Isobutyraldehyde		--	--	--	--
Methyl Ethyl Ketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	1.14	0.00

TABLE F-6 (Cont'd). CAR 72 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire	Lean Idle
Individual Hydrocarbons				
Methane	19.51	34.70	35.86	27.02
Ethylene	72.64	100.96	167.15	92.17
Ethane	6.12	9.55	14.17	8.34
Acetylene	38.20	54.67	57.02	38.41
Propane	0.09	0.82	1.25	0.57
Propylene	30.90	41.60	119.01	41.52
Benzene	19.18	26.43	70.83	24.03
Toluene	56.37	72.92	790.41	103.36
Organic Sulfides				
Carbonyl Sulfide	0.00	0.00	0.00	0.01
Methyl Sulfide	0.00	0.00	0.00	0.01
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.01	0.01	0.01	0.02
Monoethylamine	0.01	0.00	0.01	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	9.20	10.71	10.23	16.87
Bromine	6.46	8.09	5.20	9.78
Phosphorus	0.06	0.06	0.06	0.08
Silicon				
Cadmium	0.01	0.01	0.01	0.01
Aluminum				
Sulfur	0.04	0.04	0.14	0.11
Sodium	0.03	0.03	0.04	0.05
Magnesium	0.01	0.01	0.01	0.01
Chlorine	6.44	7.91	2.90	5.58
Zinc	0.03	0.04	0.08	0.06
Copper				
Nickel				
Iron	0.49	0.28	0.71	0.69
Vanadium		0.01		
Calcium	0.01		0.01	0.02

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

TABLE F-7. CAR 73 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

	Average Emission Rate, mg/km (Except as Noted)		
	Unmod.	Rich Idle	12% Misfire
Test No. PVM	73	731	732
Barometer, mm Hg	749.2	743.1	741.0
Humidity, g/kg	5.2	7.7	9.7
Temperature, °C	24.4	24.8	25.9
Total Fuel Sulfur, mg/km	28.89	29.60	31.11
Avg. Exh. Oxygen, %	1.74	0.76	--
Carbon Dioxide, g/km	380.8	335.1	381.6
Fuel Cons., ℓ/100 km	17.75	18.18	19.11
Regulated Emissions			
Hydrocarbons (THC), g/km	2.05	2.92	14.04
Carbon Monoxide, g/km	18.07	51.93	13.78
Oxides of Nitrogen, g/km	2.64	2.28	1.90
Particulates			
Total Particulates	114.55	111.15	222.29
Sulfate	1.11	0.64	2.50
Compound Group Totals			
Aldehydes & Ketones	73.5	51.9	228.3
Individual Hydrocarbons	789.9	1182.6	2996.9
Organic Sulfides	0.22	0.17	0.08
Organic Amines	0.03	0.18	0.15
Other Compounds			
Ammonia	5.72	2.69	4.71
Cyanide & Cyanogen	3.60	5.29	1.76
Hydrogen Sulfide	0.05	0.05	0.00
Tetramethyllead	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00
Tetraethyllead	--	--	0.00
Ethylene Dibromide	0.00	0.00	3.02
Aldehydes & Ketones			
Formaldehyde	66.77	45.27	177.97
Acetaldehyde	6.74	5.96	34.29
Acetone	0.00	0.31	12.05
Isobutyraldehyde	--	--	--
Methyl Ethyl Ketone	0.00	0.32	2.83
Hexanaldehyde	0.00	0.00	2.15

*One run only

TABLE F-7 (Cont'd). CAR 73 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

	Average Emission Rate, mg/km (Except as Noted)		
	Unmod.	Rich Idle	12% Misfire
Individual Hydrocarbons			
Methane	84.48	187.10	87.20
Ethylene	218.45	282.32	367.26
Ethane	18.26	25.30	30.07
Acetylene	89.34	165.33	94.19
Propane	5.96	2.40	2.60
Propylene	102.08	120.03	232.80
Benzene	56.94	87.79	200.55
Toluene	214.35	312.33	1981.21
Organic Sulfides			
Carbonyl Sulfide	0.18	0.06	0.01
Methyl Sulfide	0.04	0.10	0.07
Ethyl Sulfide	0.01	0.01	0.00
Methyl Disulfide	0.00	0.01	0.00
Organic Amines			
Monomethylamine	0.03	0.18	0.15
Monoethylamine	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00
Triethylamine			
Trace Elements[a]			
Lead	20.26	16.56	35.38
Bromine	8.89	7.66	13.24
Phosphorus	0.15	0.08	0.23
Silicon			
Cadmium			0.01
Aluminum	0.22	0.25	0.36
Sulfur	0.53	0.42	1.28
Sodium	0.02	0.02	0.11
Magnesium	0.02	0.01	0.05
Chlorine	2.49	2.46	3.23
Zinc	0.07		0.26
Copper			0.05
Nickel			
Iron	3.43	1.21	15.23
Vanadium	0.01		0.01
Calcium	0.09	0.02	0.29

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

TABLE F-8. CAR 73 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

		Average Emission Rate, mg/km (Except as Noted)		
		Unmod.	Rich Idle	12% Misfire
Test No.	PVM	73	731	732
Barometer,	mm Hg	749.3	742.7	740.4
Humidity,	g/kg	5.4	7.2	8.7
Temperature,	°C	27.0	25.3	25.0
Total Fuel Sulfur,	mg/km	20.17	20.40	23.02
Avg. Exh. Oxygen,	%	2.15	0.95	--
Carbon Dioxide,	g/km	278.4	262.0	291.8
Fuel Cons.,	ℓ/100 km	12.39	12.53	14.14
Regulated Emissions				
Hydrocarbons (THC),	g/km	1.23	1.64	9.86
Carbon Monoxide,	g/km	5.06	16.74	5.24
Oxides of Nitrogen,	g/km	3.24	3.26	1.92
Particulates				
Total Particulates		67.79	66.47	144.61
Sulfate		0.29	0.39	1.49
Compound Group Totals				
Aldehydes & Ketones		37.6*	34.0	163.20
Individual Hydrocarbons		524.3	753.4	2090.8
Organic Sulfides		0.10	0.02	0.01
Organic Amines		0.06	0.17	0.07
Other Compounds				
Ammonia		2.70	5.43	2.81
Cyanide & Cyanogen		1.69	4.87	0.46
Hydrogen Sulfide		0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00
Ethylene Dichloride		0.00*	0.00*	0.00
Tetraethyllead		--	--	0.00
Ethylene Dibromide		0.00	0.00	1.83
Aldehydes & Ketones				
Formaldehyde		34.77*	32.68	136.53
Acetaldehyde		2.79*	1.10	19.65
Acetone		0.00*	0.25	4.36
Isobutyraldehyde		--	--	--
Methyl Ethyl Ketone		0.00*	0.00	1.53
Hexanaldehyde		0.00*	0.00	0.67

*One run only

TABLE F-8 (Cont'd). CAR 73 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

	Average Emission Rate, mg/km (Except as Noted)		
	Unmod.	Rate Idle	12% Misfire
Individual Hydrocarbons			
Methane	39.92	87.81	53.55
Ethylene	171.64	219.97	343.12
Ethane	13.86	20.34	26.05
Acetylene	55.99	102.24	65.27
Propane	0.57	1.33	1.90
Propylene	78.12	92.40	231.09
Benzene	39.43	59.82	102.50
Toluene	124.79	169.47	1267.24
Organic Sulfides			
Carbonyl Sulfide	0.08	0.01	0.01
Methyl Sulfide	0.02	0.01	0.00
Ethyl Sulfide	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00
Organic Amines			
Monomethylamine	0.06	0.16	0.07
Monoethylamine	0.00	0.01	0.00
Trimethylamine	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00
Trace Elements[a]			
Lead	17.26	13.67	24.83
Bromine	6.49	8.57	10.79
Phosphorus	0.17	0.12	0.16
Silicon	0.02		
Cadmium	0.01	0.01	0.01
Aluminum	0.15	0.05	0.48
Sulfur	0.14	0.07	0.89
Sodium	0.07	0.04	0.11
Magnesium	0.02	0.01	0.04
Chlorine	3.28	2.98	2.41
Zinc	0.08	0.05	0.24
Copper	0.01		0.02
Nickel			
Iron	2.17	0.44	20.32
Vanadium	0.01		0.01
Calcium	0.06	0.04	0.07

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

TABLE F-9. CAR 73 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

		Average Emission Rate, mg/km (Except as Noted)		
		Unmod.	Rich Idle	12% Misfire
Test No.	PVM	73	731	732
Barometer,	mm Hg	748.8	742.2	740.2
Humidity,	g/kg	6.0	7.4	8.8
Temperature,	°C	29.2	27.0	27.0
Total Fuel Sulfur,	mg/km	17.92	18.02	21.04
Avg. Exh. Oxygen,	%	1.84	0.95	--
Carbon Dioxide,	g/km	245.5	240.9	268.5
Fuel Cons.,	ℓ/100 km	11.01	11.07	12.93
Regulated Emissions				
Hydrocarbons (THC),	g/km	1.26	1.49	8.60
Carbon Monoxide,	g/km	5.44	8.71	4.56
Oxides of Nitrogen,	g/km	3.58	3.61	1.89
Particulates				
Total Particulates		80.23	93.43	118.30
Sulfate		0.62	0.43	1.11
Compound Group Totals				
Aldehydes & Ketones		34.8	39.5	199.7
Individual Hydrocarbons		541.9	676.9	1907.6
Organic Sulfides		0.06	0.03	0.01
Organic Amines		0.04	0.28	0.05
Other Compounds				
Ammonia		2.58	3.13	3.85
Cyanide & Cyanogen		4.57	7.81	2.25
Hydrogen Sulfide		0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00
Tetraethyllead		--	--	0.00
Ethylene Dibromide		0.00	0.00	3.57
Aldehydes & Ketones				
Formaldehyde		30.87*	36.46	173.17
Acetaldehyde		3.71*	2.76	19.08
Acetone		0.00*	0.26	5.91
Isobutyraldehyde		--	--	--
Methyl Ethyl Ketone		0.23*	0.00	1.54
Hexanaldehyde		0.00	0.00	0.00

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*One run only

TABLE F-9 (Cont'd). CAR 73 AVERAGE RESULTS FOR THE UNMODIFIED AND MALFUNCTION CONFIGURATIONS - HFET

	Average Emission Rate, mg/km (Except as Noted)		
	Unmod.	Rich Idle	12% Misfire
Individual Hydrocarbons			
Methane	45.56	67.60	53.31
Ethylene	174.96	206.85	346.06
Ethane	14.88	19.77	26.15
Acetylene	66.53	96.77	69.11
Propane	1.12	1.10	1.87
Propylene	78.24	90.94	230.52
Benzene	39.98	49.26	104.35
Toluene	120.59	144.58	1076.22
Organic Sulfides			
Carbonyl Sulfide	0.03	0.01	0.01
Methyl Sulfide	0.03	0.02	0.01
Ethyl Sulfide	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00
Organic Amines			
Monomethylamine	0.02	0.18	0.05
Monoethylamine	0.01	0.10	0.00
Trimethylamine	0.01	0.00	0.00
Diethylamine	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00
Trace Elements[a]			
Lead	11.67	10.36	19.37
Bromine	6.72	5.86	9.82
Phosphorus	0.17	0.15	0.13
Silicon			
Cadmium		0.01	0.01
Aluminum	0.05		0.17
Sulfur	0.10	0.06	0.54
Sodium	0.03	0.03	0.06
Magnesium	0.02	0.01	0.02
Chlorine	1.97	2.07	2.00
Zinc	0.08	0.04	0.15
Copper			0.02
Nickel			
Iron	1.23	0.08	5.63
Vanadium		0.01	
Calcium	0.07	0.03	0.05

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

TABLE F-10. CAR 74 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

		Average Emission Rate, mg/km (Except as Noted)			
		Unmod.	Rich Idle	12% Misfire [b]	Lean Idle
Test No.	PVM	71	741	742	743
Barometer,	mm Hg	743.87	739.7	741.6	747.9
Humidity,	g/kg	10.9	12.0	12.8	9.4
Temperature,	°C	24.4	25.3	25.3	24.7
Total Fuel Sulfur,	mg/km	26.51	29.32	31.10	26.04
Avg. Exh. Oxy.,	%	1.37	1.03	3.44	4.36
Carbon Dioxide,	g/km	353.5	317.00	373.8	349.25
Fuel Cons.,	ℓ/100 km	16.28	18.01	19.1	16.00
Regulated Emissions					
Hydrocarbons (THC),	g/km	2.35	3.75	14.93	3.27
Carbon Monoxide,	g/km	13.04	50.07	16.87	9.62
Oxides of Nitrogen,	g/km	3.66	3.32	3.42	3.74
Particulates					
Total Particulates		95.57	111.78	179.27	91.05
Sulfate		0.27	0.45	0.93	0.50
Compound Group Totals					
Aldehydes & Ketones		22.8	22.7	92.3	20.7
Individual Hydrocarbons		848.7	1698.6	3566.4	1029.4
Organic Sulfides		0.00	0.26	0.06	0.10
Organic Amines		0.04	0.02	0.01	0.03
Other Compounds					
Ammonia		4.78	4.72	16.60	3.52
Cyanide & Cyanogen		0.88	2.17	0.40	2.02
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00
Tetraethyllead		0.00	0.00	0.00	0.00
Ethylene Dibromide		0.00	0.00	3.81	0.00
Aldehydes & Ketones					
Formaldehyde		21.29	20.11	87.97	19.04
Acetaldehyde		1.42	2.56	2.44	1.58
Acetone		0.23	0.06	0.14	0.05
Isobutyraldehyde		--	--	--	--
Methyl Ethyl Ketone		0.00	0.00	0.00	0.00
Hexanaldehyde		0.00	0.00	1.72	0.00

TABLE F-10 (Cont'd). CAR 74 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - FTP

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire[b]	Lean Idle
Individual Hydrocarbons				
Methane	76.86	352.98	109.54	67.12
Ethylene	247.81	368.66	272.15	292.96
Ethane	23.30	32.42	31.58	24.04
Acetylene	77.35	344.26	109.65	59.94
Propane	2.56	3.22	3.92	2.53
Propylene	132.21	159.06	260.04	163.11
Benzene	53.41	93.26	182.59	59.67
Toluene	235.15	344.73	2496.99	360.07
Organic Sulfides				
Carbonyl Sulfide	0.00	0.26	0.06	0.05
Methyl Sulfide	0.00	0.00	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.04	0.01	0.01	0.03
Monoethylamine	0.02	0.01	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	19.39	25.01	33.40	19.33
Bromine	8.82	11.28	13.05	9.14
Phosphorus	0.23	0.21	0.28	0.21
Silicon			0.02	
Cadmium		0.01		0.01
Aluminum			0.11	
Sulfur	0.13	0.20	0.82	0.11
Sodium	0.07	0.08	0.07	0.07
Magnesium	0.02	0.03	0.04	0.02
Chlorine	3.74	6.69	4.94	3.28
Zinc	0.11	0.11	0.18	0.10
Copper			0.04	0.01
Nickel				
Iron	0.59	1.14	12.63	0.29
Vanadium				
Calcium	0.18	0.16	0.19	0.16

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

[b] 12% misfire and 10° ignition retard.

TABLE F-11. CAR 74 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire[b]	Lean Idle
Test No. PVM	74	741	742	743
Barometer, mm Hg	743.9	740.1	742.1	747.9
Humidity, g/kg	9.9	11.4	11.4	8.7
Temperature, °C	24.4	25.9	25.0	24.4
Total Fuel Sulfur, mg/km	20.22	21.6	23.90	20.4
Avg. Exh. Oxygen, %	1.43	0.99	3.49	3.76
Carbon Dioxide, g/km	276.27	270.2	293.3	279.4
Fuel Cons., ℓ/100 km	12.42	13.28	14.68	12.54
Regulated Emissions				
Hydrocarbons (THC), g/km	1.63	2.10	11.63	2.18
Carbon Monoxide, g/km	6.06	21.83	8.73	4.75
Oxides of Nitrogen, g/km	4.33	4.49	4.14	4.71
Particulates				
Total Particulates	78.53	102.04	124.58	90.96
Sulfate	0.49	0.51	0.82	0.68
Compound Group Totals				
Aldehydes & Ketones	16.3	26.4	117.5	10.25
Individual Hydrocarbons	674.3	976.8	2790.40	739.20
Organic Sulfides	0.00	0.2	0.06	0.05
Organic Amines	0.01	0.00	0.02	0.01
Other Compounds				
Ammonia	2.78	6.01	10.64	4.69
Cyanide & Cyanogen	1.66	0.44	0.28	0.78
Hydrogen Sulfide	0.00	0.00	0.00	0.00
Tetramethyllead	0.00	0.00	0.00	0.00
Ethylene Dichloride	0.00	0.00	0.00	0.00
Tetraethyllead	0.00	0.00	0.00	0.00
Ethylene Dibromide	0.00	0.00	3.65	0.00
Aldehydes & Ketones				
Formaldehyde	15.01	24.20	108.04	9.33
Acetaldehyde	1.08	2.11	2.74	0.90
Acetone	0.24	0.05	5.99	0.00
Isobutyraldehyde	--	--	--	--
Methyl Ethyl Ketone	0.00	0.00	0.73	0.00
Hexanaldehyde	0.00	0.00	0.00	0.00

TABLE F-11(Cont'd). CAR 74 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - SET

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire[b]	Lean Idle
Individual Hydrocarbons				
Methane	52.39	133.09	79.71	48.86
Ethylene	208.62	276.61	386.31	243.28
Ethane	19.07	25.33	31.13	19.32
Acetylene	62.59	142.59	83.19	60.79
Propane	1.68	1.93	5.77	1.85
Propylene	108.27	128.01	281.85	127.68
Benzene	48.12	61.00	152.98	44.78
Toluene	173.53	208.26	1769.45	192.68
Organic Sulfides				
Carbonyl Sulfide	0.00	0.02	0.06	0.05
Methyl Sulfide	0.00	0.01	0.00	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.01	0.00	0.02	0.01
Monoethylamine	0.00	0.00	0.00	0.01
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	30.80	24.23	17.98	30.16
Bromine	17.45	13.97	8.14	18.65
Phosphorus	0.28	0.19	0.16	0.23
Silicon				
Cadmium	0.02	0.02	0.01	0.02
Aluminum	0.07	0.03	0.02	0.07
Sulfur	0.18	0.12	0.35	0.16
Sodium	0.13	0.09	0.07	0.11
Magnesium	0.04	0.03	0.02	0.03
Chlorine	6.52	5.97	2.82	5.44
Zinc	0.22	0.11	0.11	0.14
Copper				0.02
Nickel				
Iron	0.73	0.55	2.74	0.34
Vanadium				
Calcium	0.25	0.14	0.11	0.18

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

[b] 12% misfire and 10° ignition retard.

TABLE F-12. CAR 74 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

		Average Emission Rate, mg/km (Except as Noted)			
		Unmod.	Rich Idle	12% Misfire[b]	Lean Idle
Test No.	PVM	74	741	742	743
Barometer,	mm Hg	743.8	740.1	742.2	747.7
Humidity,	g/kg	10.2	11.2	11.1	8.4
Temperature,	°C	25.6	26.4	25.6	25.3
Total Fuel Sulfur,	mg/km	17.91	18.63	20.26	17.68
Avg. Exh. Oxygen,	%	1.41	1.13	3.38	2.59
Carbon Dioxide,	g/km	243.8	247.8	250.45	242.00
Fuel Cons.,	ℓ/100 km	11.00	11.44	12.44	10.86
Regulated Emissions					
Hydrocarbons (THC),	g/km	1.59	1.75	10.06	1.72
Carbon Monoxide,	g/km	5.69	9.31	5.81	4.36
Oxides of Nitrogen,	g/km	4.24	4.30	3.91	4.34
Particulates					
Total Particulates		73.3	100.6	119.78	79.90
Sulfate		0.31	0.48	0.81	0.27
Compound Group Totals					
Aldehydes & Ketones		27.0	22.2	42.0	14.6
Individual Hydrocarbons		670.2	807.9	2492.3	684.0
Organic Sulfides		0.00	0.00	0.11	0.00
Organic Amines		0.00	0.00	0.05	0.02
Other Compounds					
Ammonia		5.63	7.84	10.18	4.41
Cyanide & Cyanogen		5.14	0.91	0.73	3.96
Hydrogen Sulfide		0.00	0.00	0.00	0.00
Tetramethyllead		0.00	0.00	0.00	0.00
Ethylene Dichloride		0.00	0.00	0.00	0.00
Tetraethyllead		0.00	0.00	0.00	0.00
Ethylene Dibromide		0.00	0.00	3.64	0.00
Aldehydes & Ketones					
Formaldehyde		26.10	20.33	32.43	13.75
Acetaldehyde		0.73	1.83	7.47	0.84
Acetone		0.20	0.00	0.00	0.00
Isobutyraldehyde		--	--	--	--
Methyl Ethyl Ketone		0.00	0.00	1.26	0.00
Hexanaldehyde		0.00	0.00	0.84	0.00

TABLE F-12 (Cont'd). CAR 74 AVERAGE RESULTS FOR THE UNMODIFIED AND THE MALFUNCTION CONFIGURATIONS - HFET

	Average Emission Rate, mg/km (Except as Noted)			
	Unmod.	Rich Idle	12% Misfire[b]	Lean Idle
Individual Hydrocarbons				
Methane	51.29	79.69	66.56	46.80
Ethylene	207.63	246.81	352.88	216.40
Ethane	19.71	24.41	29.41	18.34
Acetylene	71.32	102.79	83.24	66.69
Propane	1.48	1.53	6.66	1.35
Propylene	105.40	119.96	254.48	110.55
Benzene	48.04	55.59	36.50	43.87
Toluene	165.40	177.16	1573.80	180.02
Organic Sulfides				
Carbonyl Sulfide	0.00	0.00	0.07	0.00
Methyl Sulfide	0.00	0.00	0.04	0.00
Ethyl Sulfide	0.00	0.00	0.00	0.00
Methyl Disulfide	0.00	0.00	0.00	0.00
Organic Amines				
Monomethylamine	0.00	0.00	0.05	0.02
Monoethylamine	0.00	0.00	0.00	0.00
Trimethylamine	0.00	0.00	0.00	0.00
Diethylamine	0.00	0.00	0.00	0.00
Triethylamine	0.00	0.00	0.00	0.00
Trace Elements[a]				
Lead	17.50	25.08	18.11	23.79
Bromine	12.04	15.23	9.09	16.73
Phosphorus	0.11	0.09	0.15	0.13
Silicon				
Cadmium	0.01	0.02	0.01	0.01
Aluminum	0.02	0.06	0.02	0.04
Sulfur	0.04	0.07	0.32	0.06
Sodium	0.06	0.08	0.05	0.08
Magnesium	0.02	0.02	0.02	0.02
Chlorine	5.27	5.81	2.83	6.26
Zinc	0.05	0.06	0.07	0.06
Copper		0.01	0.04	
Nickel				
Iron	0.15	0.33	3.11	0.12
Vanadium		0.01		
Calcium	0.06	0.05	0.06	0.08

[a] This table excludes all elements having measured emissions values consistently below 0.01 mg/km.

[b] 12% misfire and 10° ignition retard.